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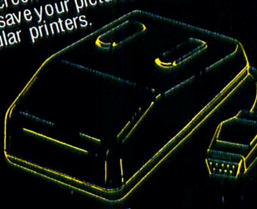

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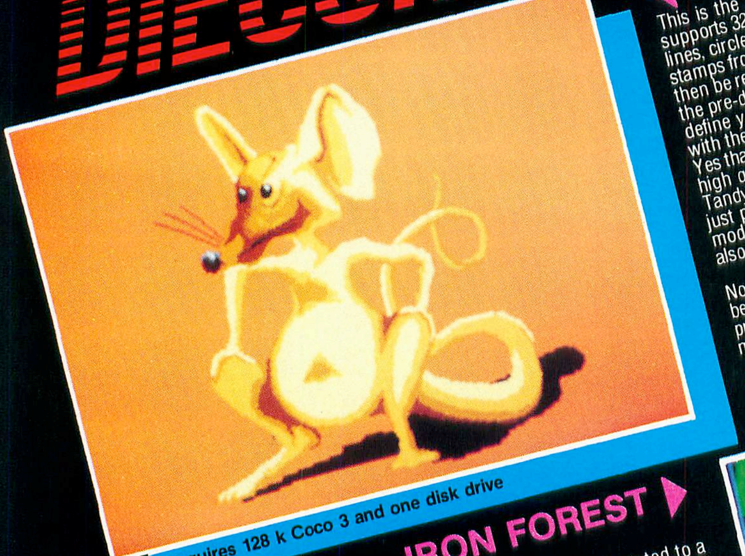

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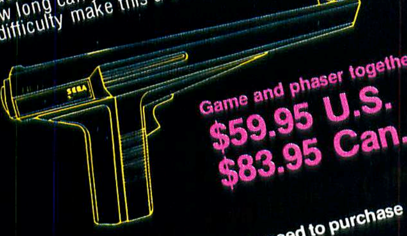

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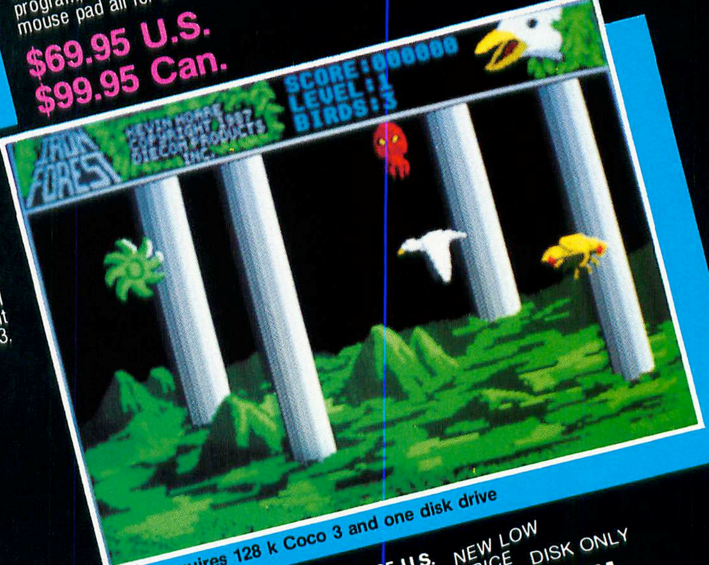
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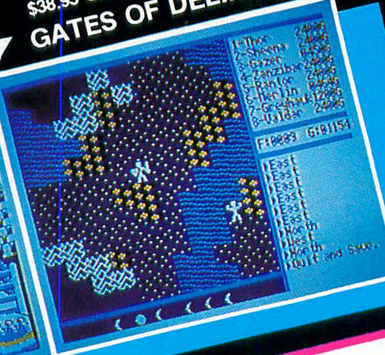
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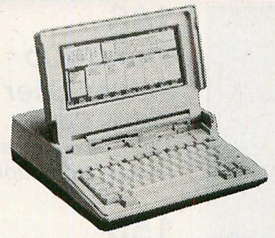

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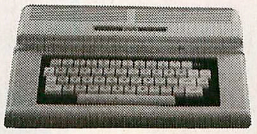

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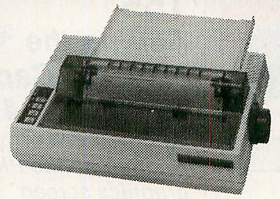

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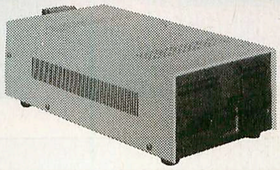

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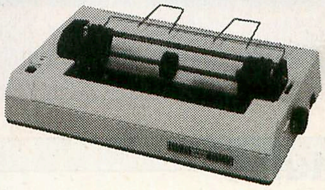

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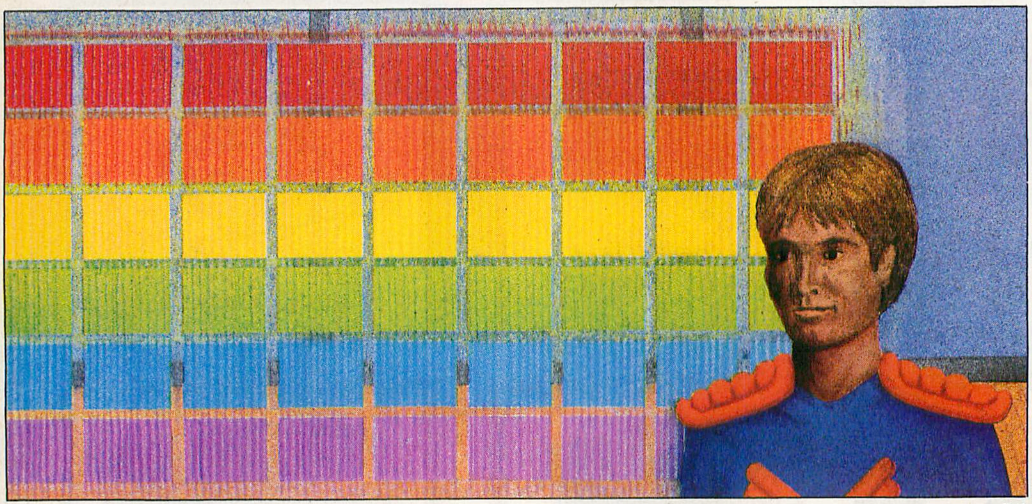
Table of Contents

May 1988
Vol. VII No. 10



20

Features

20
Strata
Michael T. Sirolly
A fast-paced action game

30
One Good Turn Deserves Another
Eric Tucker
A strategy game for two players

36
Ye Olde Font
Bill Bernico
Graphics print font styles

42
CoCo 3 Color Dump
Duane M. Perkins
Dumping CoCo 3 graphics screens to the CGP-220

52
Sign In, Please!
Jim Bennett
Using the CoCo to copy your signature

58
PMODE Polychrome
Tracy L. Skaggs
Dumping PMODE 3 and 4 screens in color

95
Printing in Two Columns
Charles E. Brown, Jr.
Eye-catching newsletters with a two-column format

100
The Ins and Outs of Boolean
Eric Levinson
Binary math practice

104
The LLISTing Formatter
Clay Howe
A useful utility for LLISTing shortcuts

110
Printer Overview
Ed Ellers
A look at six printer types

114
Center That Header
Doug Anderson
Transferring centered headings to the DMP-110

116
Bulletin Board Standout
George Quellhorst
Printing posters with the DMP-130

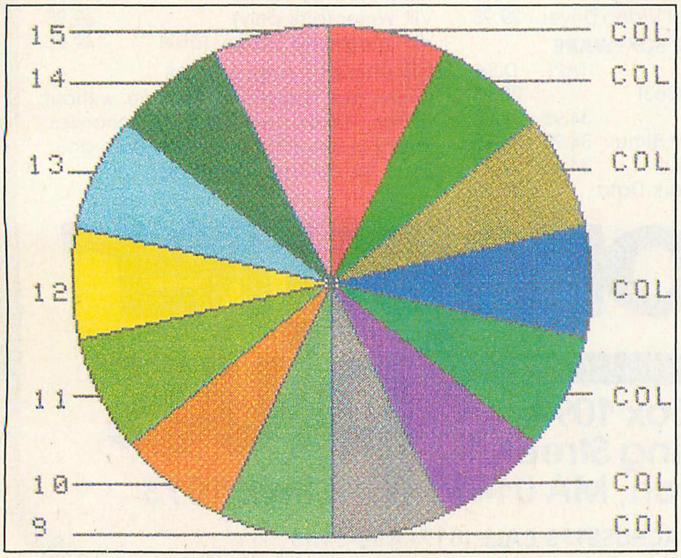
146
The CoCo Power User
Alan J. Corson
The CoCo 3 as an effective office automation tool

150
Static RAM Interface
Dennis H. Weide
A RAM pack for your CoCo ROM port

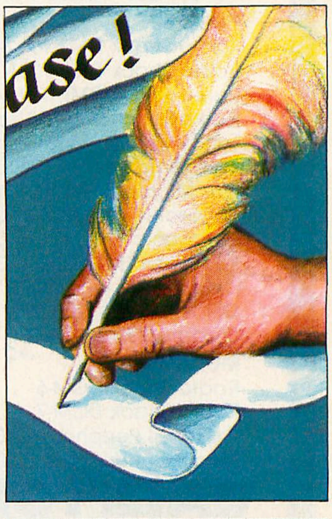
155
Adding the HPRINT Capability to PMODE 4
Douglas Pokorny
Printing on the PMODE 4 graphics screen

164
Formatting Text With Telewriter
Jose L. Jimenez
An easy way to produce good-looking documents

42



52



The cassette tape/disk symbols beside features and columns indicate that the program listings with those articles are on this month's RAINBOW ON TAPE and RAINBOW ON DISK. Those with only the disk symbol are not available on RAINBOW ON TAPE. For details, check the RAINBOW ON TAPE and RAINBOW ON DISK ad on Page 119.

Novices Niche

90
Non-Smoking Section
Ana M. Rodriguez

91
CoCo 3 Canvas
George and Ellen Aftamonow

91
Ticket Maker
Ed Schenck

92
Graphics Reference Chart
Daniel T. Weaver

92
A Full-Page Dump for the DMP-105
John Handis

93
Color in 32 Columns
Chuck Katsekes

93
Phrase Centerer
Gip Wayne Plaster, II

94
Blockout Wipeout
Tony Owens

Departments

Advertisers Index ____ 192
Back Issue Information ____ 97
CoCo Gallery ____ 18
Corrections ____ 154
Letters to Rainbow ____ 6
Maxwell Mouse ____ 25
One-Liners ____ 14, 33, 188, 189
One-Liner Contest Information ____ 182
Racksellers ____ 190
Rainbow Info ____ 10
Received & Certified ____ 140
Scoreboard ____ 78
Scoreboard Pointers ____ 80
Submitting Material to Rainbow ____ 184
Subscription Info ____ 16

Columns

82
BASIC Training
Joseph Kolar
Swamp think

16
Building May's Rainbow
Jutta Kapfhammer
Managing Editor's notes

158
CoCo Consultations
Marty Goodman
Just what the doctor ordered

160
Delphi Bureau
Cray Augsburg
What's in a file? and Hutchison's database report

148
Doctor ASCII
Richard Esposito
The question fixer

88
Education Notes
Steve Blyn
A review of synonyms, homonyms and antonyms

12
PRINT#-2,
Lawrence C. Falk
Editor's notes

168
Turn of the Screw
Tony DiStefano
Multi-Pak LED update

74
Wishing Well
Fred Scerbo
Reading and decoding skills

Rainbowtech

170
Barden's Buffer
William Barden, Jr.
The mystery of the Tandy anagram

178
KISSable OS-9
Dale L. Puckett
Patches, programs and politics

Product Reviews

Astro Fortune Teller/*Saint John Gallery* ____ 130
Data Master/*Computerware* ____ 128
Indiana Jim/*Lomiq, Inc.* ____ 138
Laser Surgeon: The Microscopic Mission/*Activision* ____ 126
Lot-Pro/*CJN Enterprises* ____ 130
OS-9 Development System/*Tandy Corporation* ____ 132
The Rat/*Diecom Products* ____ 137
REMusic/*Codis Enterprises* ____ 136
Telewriter-128/*Cognitec* ____ 133
Textform/*R.A.D. Products* ____ 131
Tomb of T'ien/*Valkyrie Software* ____ 129

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tters to the RAINBOW

Editor:

Here are some comments relevant to the Rule of 78's that users of Jack W. Eizenga's program of the same name (March '88 RAINBOW, Page 100) may find of value.

The rule (also known as the Sum-of-the-Digits Method) has been outlawed in several states due to its unfairness to the consumer. The battle to defeat such a measure was led by lending institutions, which have managed to keep it intact in most other states. A few states have restricted its use to loan payback periods under three or four years.

A legal review article on R-78, originating at Boston University Law School, concludes it is unfair to consumers when interest rates are fairly high and payback term is fairly long, and especially when both these conditions exist. The article ends with a general plea to the legal community to help abolish the rule entirely.

The only notice in a loan contract that the Rule of 78's will be invoked on early payoff is a bare mention of the rule. By law, it has to be so mentioned, and can be found in the fine print if one looks closely. Lenders are *not* required to explain it and won't, unless pressed. Even then, most cannot offer an easy explanation because of the relative complexity of the concept and an understandable reluctance to reveal to a borrower how he or she will be ripped off (under certain conditions) if an early payoff becomes possible.

At least one supposedly authoritative source of information on the rule, a weighty tome called *Thorndike's Encyclopedia of Banking and Financial Tables*, is misleading in its comments on the rule. Essentially, it says that the approximate payoff figures of a loan are so close to those derived from the usual accrual method of amortization that any minor differences can be ignored. That statement is true for short-term loans with reasonable interest rates. It is totally false for long-term loans and higher interest rates — a fact not mentioned.

Mr. Eizenga seems to knuckle under a bit to the lenders in his statement that calculating the Rule of 78's won't keep you from having the penalty assessed but will keep you from suffering an unpleasant surprise if you pay off early. Paying the penalty doesn't necessarily have to happen. There have been several cases of the rule being challenged successfully, based on the rationale that use of the rule constitutes a *hidden prepayment penalty* directly conflicting with other language in most contracts, which says there isn't any prepayment penalty. Last year, such a battle was won by the undersigned on exactly that basis against a bank that was, because of the Rule of 78's, demanding some $900 more in payoff than actually fairly owed for the time elapsed (4.6 years) on a 10-year loan.

In connection with that battle, the CoCo 2 played a major role, running a Rule of 78's amortization schedule and regular amortization schedules for comparisons the bank could not refute. The regular amortization schedule program used was the one by Bill Barden on Page 5 of his book, *TRS 80 Color Computer & MC-10 Programs*. The R-78 amortization program was an adaptation of Barden's program, needing only minor formula and heading changes. Combining the two programs was to have been a programming project, but Jack Eizenga's nifty program saves that effort. I wish I'd had it at the time! Thank you for featuring it and Jack for writing it. It is a valuable addition to the financial programs disk here at home.

I hope these comments help someone else disadvantageously involved or about to be involved with the Rule of 78's. The best way to avoid being penalized by it is to be sure it is not in your loan contract. Lenders are in the business of making money. If you are a decent financial risk, you can threaten to walk out on any new, to-be-signed contract with the Rule of 78's mentioned as applicable if you pay off early. Chances are good the lender will swiftly present another contract for your signature, one which doesn't call for the pesky R-78 and treats you fairly if you pay off early.

Bob Tatom
Mobile, AL

REVIEWING REVIEWS

Editor:

My thanks to Jerry Semones for his review of *GrafFind* in the April '88 issue. My only disappointment was his failure to mention the 39 digitized pictures that are included on the program disk. This is no small matter when picture disks are going for $10 to $20 for 20 or so pictures. Thank you again for a delightful review.

D. Steven Ricketts
President
RainyDay Software
Boring, OR

HINTS AND TIPS

Editor:

In the January '88 issue of RAINBOW there appeared a hardware project titled "Child-Proofing the CoCo." This project made a keyboard-locking switch that would prevent children from messing up your programs.

I found that basically the same thing could be done with one simple poke. Just type `POKE &HFF0F,&HF0`.

That locks the keys so that nothing can be typed. To put everything back to normal, just press the reset button.

Glen Johnsrud
Lorette, Manitoba

Battling Cassette I/O Errors

Editor:

I am saving up for a disk drive. Until then, I am using my Realistic CTR-65 cassette recorder to store files. Lately I have been having a terrible time with I/O Errors. Here are some tips I have found to be helpful.

First, some I/O Errors can be "fixed" by unplugging the gray AUX plug when doing a CLOAD. Second, you want to unplug the black EAR plug when making CSAVEs. Why? On my machine, and most other recorders not specifically designed for computer use, the earphone jack is used as a monitor output when recording from radio or microphone. Apparently there isn't sufficient separation of the "mic" and "ear" circuits in the CoCo's cassette interface, and a small hum records on the tape along with the audio input from the CoCo as it records the program.

Terry F. Phillips, Sr.
Elkhart, IN

Clean Machine

Editor:

I read and enjoy every issue of THE RAINBOW, and I learn something from each one. I believe we are *all* beginners, never fully able to master our Color Computers. I was especially glad to see "A Glossary of Computer Terms" by Lee Veal in the January 1988 issue. I think this should have been in the magazine years ago. Even though I've had a CoCo for over six years, I am still learning. In fact, I learned that the "RS" in "RS-232" means "Recommended Standard," *not* "Radio Shack."

I have a hint on cleaning the CoCo's keyboard: Use a dry, skinny paint brush, like one that comes with paint-by-number sets, to remove dust, hair, etc., from between the keys. I also use one to clean the printer.

Also, use the following hint on the CoCo 3 to CLOAD or CLOADM programs from tape if you don't know the exact start. It saves entering CLOAD over and over. You don't need to specify the name of the program:

```
1 ON ERR GOTO 4
2 CLOAD(M)
3 END
4 RUN
```

Lee Deuell
Shell Rock, IA

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Advanced system of keystroke macros lets you automate any activity, such as dial via modem, sign-on, interact, sign-off, print, save. Perform entire session. Act as message taker. At start-up, disk version can automatically set parameters, dial, sign-on, interact, read/write disk, sign-off, etc. Timed execution lets AUTOTERM work while you sleep or play. No other computer can match your COCO's intelligence as a terminal.

PXE Computing
11 Vicksburg Lane
Richardson, Texas 75080
214/699-7273

to name a few, have been very good to me; great products, fast delivery. Now, the problem:

Spectrum Projects, an advertiser of yours, is selling a 512K CoCo 3 sticker for $4.99 plus a $3 shipping charge. You might think you're getting the metal "Tandy" plate, but what you actually get is roughly a 2½-by-⅜-inch adhesive foil tape with "512K CoCo" printed in tiny font with a black background. And no matter how careful you are, the black rubs off.

I can get these stickers printed locally for nine cents each. Plus, they [Spectrum] do general 4th Class mail, you know, "Some day delivery" for about 22 cents.

Also, I cannot see why Spectrum would market a fine product like *The Schematic Processor* with the original programmer's notes. Can't the folks at Spectrum type? It sure would make it seem like you're dealing with a respectable company.

If you don't choose to print this letter, I understand. But CoCo users should be aware of how much of a ripoff this really is.

Robert N. Carman II
Omaha, NE

We have received a number of complaints regarding Spectrum Projects. However, effective with the March '88 issue, Spectrum Projects no longer advertises its products in THE RAINBOW. *And according to a letter some of our advertisers have received from Spectrum Projects, it is no longer doing business. Any complaints about this mail order business should be directed to: The Postmaster General, Howard Beach, NY 11414.*

KUDOS

Editor:

I am just writing to compliment Dave Archer on his "Number Cruncher" *SUM128* program. I should have written in about some other programs long ago, as I have enjoyed many of them; this one I have modified, and it is very useful to me. I bought my first RAINBOW in January 1983 and subscribed to it a few months later. I also subscribed to RAINBOW ON TAPE until the disk version was available. Thanks for a great magazine. A Louisville RAINBOWfest sounds good, also.

Lyle Warner
Flint, MI

A Satisfied Customer

Editor:

I just wanted to tell you how delightful it has been dealing with one of your advertisers, S.D. Enterprises, and its flagship product, *VIP Writer III*. When I initially called with a multitude of questions, Paul Anderson at S.D.E. was very patient and spent a good deal of time on the phone answering all the questions I had. To top it off, when he heard of my disappointment with another CoCo 3 word processor, he offered me a $30 credit toward *VIP Writer III* if I sent in the one I didn't like with my order. To my knowledge, S.D.E. is extending this offer to others. Since my order arrived I have been in contact with Mr. Anderson with suggestions on how to improve *VIP Writer III*'s operation from a user's standpoint. Not only are the people at S.D.E. eager to listen to what the customer has to say, they are presently updating the program, incorporating some of these suggestions from myself and others. S.D. Enterprises is an excellent example of a good mail-order firm, which others would be wise to emulate.

Donald S. Ricketts
Boring, OR

Successful Operation

Editor:

I bought a monitor from one of your advertisers, Howard Medical, out of Chicago. I received the equipment in a week, but it did not work. I called the company, and they shipped me a replacement the next working day. It is the sort of excellent service that makes mail-order electronics possible and successful. Kudos to Howard Medical!

Dennis L. Wood
Indianapolis, IN

A Phonics Fan

Editor:

Thank you for Steve Blyn's phonics program in the March 1988 issue ("Fun With Phonics," Page 89). It is the ideal program for my use. I direct a tutorial program for over 100 at-risk elementary students. We have three 16K CoCos and one 16K ECB CoCo. I have copied and adapted as many programs as I can find, but *Phonics* was one of the best.

Phonics is open-ended, so the tutor or student can determine when to terminate the exercise. It is short, so the amateur (myself) can type it in and save it to tape, identify an error and rectify it immediately, or easily change it from 16K ECB to just 16K by rewriting the sound line (Line 170).

One program like that each month would totally justify the expenditure for RAINBOW.

Ann Schwendener
Director, Tutorial Program
The Salvation Army
Kalamazoo, MI

Colorful Praise for RGB

Editor:

Your new advertiser, RGB Computer Systems, provides an exceptional product, a hard disk that is truly 100 percent BASIC-compatible, can be partitioned for OS-9 and runs on all CoCos.

In addition to producing an excellent product, the people at RGB are accessible, knowledgeable and generous with their help. What else? They send at least $150 worth of nonessential, but very helpful, utilities in the bargain.

If I were to provide a CoCo product, I would want it to be as good as RGB's hard disk system. With RGB, one gets more than what is expected.

Jim DeStafeno
Wyoming, DE

PEN PALS

- I am looking for pen pals anywhere in the U.S.A. I have a CoCo 2, double drives, DMP-105 printer and recorder. I will respond to all letters. I am 12 years old.

Chris Noles
2525 Quail Run
Marietta, GA 30060

- I am 19 years old and have a 64K ECB CoCo 1, new CoCo 3, disk drive, RS Speech Pak, Multi-Pak and a DMP-130A. I will answer *all* letters.

Nicholas Siclari
58 Vanderbilt Ave.
Staten Island, NY 10304

- I am 16 and have a CoCo 2, CCR-81 and a DMP-106. I also collect stamps. I write a lot of programs myself. I would like some pen pals my age.

David Hamby
1507 W. 17th
Hutchinson, KS 67501

- I have a CoCo 3, FD 501 and DMP-106, and would like to hear from anyone in the U.S.A. I like Adventures and programming in BASIC.

George Leal
P.O. Box 2232
Victoria, TX 77902

- I'm 10 years old and have a CoCo 3, a disk drive, a DMP-130 printer and a DCM-6 modem. I'm looking for a pen pal of any age. I will answer *all* letters.

Sam Newlands
130 Galiano St.
Royal Palm Beach, FL 33411

- I am a 15-year-old Boy Scout and am very interested in computers. I own a 128K Color Computer 3 and a CCR-81 cassette recorder. I like almost all types of games, especially golf games.

Jamie Stafford
4615 Rockcut Road
Norton, OH 44203

- Greetings! I have a 128K Color Computer 3 with one FD-501 drive, a DMP-105 printer, a DCM-5 auto modem, and green-screen monitor. I am 23 years old and have OS-9 Level I and BASIC09.

Eric Silnes
1317 Edgewood #1
Grafton, ND 58237

BULLETIN BOARD SYSTEMS

- There's a BBS in the Toronto area dedicated to the Color Computer. Remote Data Systems-09 has been in operation for almost two years. We have a large array of public domain software for downloading and have several knowledgeable users on such topics as OS-9. New users with new ideas are always welcome. Please call RDS-09 at (416) 283-7521. 2400/1200/300 bps, 8 data bits, no parity, 1 stop bit, 24 hours a day.

Doug V. Wright
291 Rouge Hills Dr.
Scarborough, Ontario
Canada M1C 2Z2

- The Portage Railroad Bulletin Board is open 24 hours a day at (814) 944-6588. It supports 300/1200/2400 baud. Settings should be 8 bits, full duplex, no parity. It is an IBM board, but we have a Color Computer SIGop in Conference #4.

William A. Smith
P.O. Box 101
Roaring Spring, PA 16673

- I am happy to announce that the Frisky CoCo BBS, which has been online for four years, has graduated from the 64K, three double-sided 40-track drives to a PC clone with a 62-Meg hard drive. There is a PC SIG and files, but the focus is still on Tandy's CoCo. Call (816) 436-2904, 7 days a week, 24 hours a day at 300, 1200 or 2400 baud.

Jerry Oliver, SysOp
The Frisky CoCo BBS
839 NW 69th Pl.
Kansas City, MO 64118

- I would like to let everyone know of three local BBSs in the area. First is The Rainbow's End, running at 300/1200 baud, which has five online games and plenty of downloads (public domain). Call (614) 446-7430. Online Friday through Sunday, 6 p.m. to midnight. The second is The Rabbit's Hole, running at 300 baud, online Monday through Friday, 2 p.m. to midnight. It has one online game and a few downloads (also public domain). Call (614) 367-0128. Last is CoCo Connections. It is a 300/1200 baud system with a few downloads. It is online Friday through Sunday, midnight to 6 a.m. Call (614) 446-1564.

Robert J. Grubb
Rt. 4, Box 309
Gallipolis, OH 45631

- Fast Trackin' BBS is *offline*. Please do not call its number as published in past issues of RAINBOW. It is now being operated by Jerry Downey in Hopkinsville, Kentucky, as the Midnite Express, (502) 885-4335. It runs 24 hours, 300/1200 baud 7E1. I hope to bring Fast Trackin' BBS back online someday.

David Guess
1292B Barnwood Court
Bowling Green, KY 42101

- My BBS runs on *CoBBS* modified to work under Stearman DOS. Some of the features include a faster running board, better error-trapping and machine language Xmodem upload and download routines. New users can reach the board at (615) 476-3340. It is running 24 hours a day at 300 and 1200 baud. Terminal parameters should be set at 8 bits, no parity, 1 stop bit (8N1).

Brian S. Graham
Rt. 2, Box 1036
Cleveland, TN 37311

- The Dungeon BBS of Newport, North Carolina, is now online at 300/1200/2400 baud, 24 hours a day. The board features games, Hi-Res graphics, multiple message bases, special interest groups, Shop and Swap, upload and download areas for CoCo, IBM, Apple, Commodore, Tandy and Atari computers, national network news and even a professional technical section. Call (919) 726-9737.

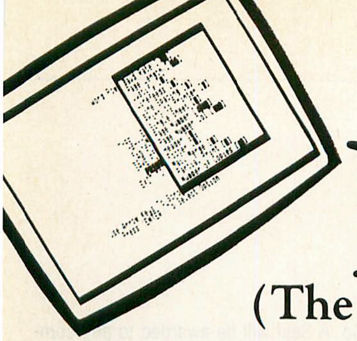
Chuck Katsekes
410 Scott Drive
Newport, NC 28570

- The Fine Art Treatise (FAT) BBS is running under *CoBBS* at 300/1200 baud, 24 hours. There are no fees, and a first-time caller has nearly full access. Featuring ASCII downloads, literature, crossbow, Never-Ending Story. Call (513) 778-9624.

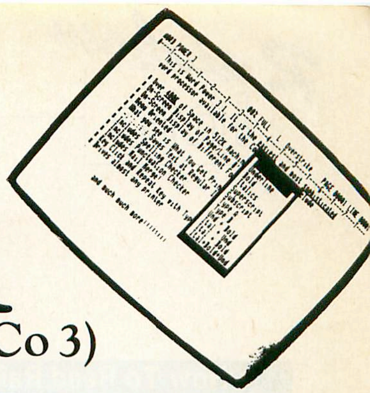
Jack Bowman
1010 Concord Ave.
Piqua, OH 45356

THE RAINBOW welcomes letters to the editor. Mail should be addressed to: Letters to Rainbow, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. Letters should include the writer's full name and address. Letters may be edited for purposes of clarity or to conserve space.

Letters to the editor may also be sent to us through our Delphi CoCo SIG. From the CoCo SIG> prompt, type `RAI` to take you into the Rainbow Magazine Services area of the SIG. At the RAINBOW> prompt, type `LET` to reach the LETTERS> prompt and then select Letters for Publication. Be sure to include your complete name and address.



Word Power 3.1



(The Ultimate Word Processor for the CoCo 3)

Power Unleashed! Unlike other word-processors, Word Power 3.1 is written from scratch for the CoCo 3. It bridges the gap between "what is" and "what should be" in word-processors. **No other word processor offers such a wide array of features that are so easy to learn and use.**

DISPLAY

The **80-column display** with true lowercase lets you view the full width of a standard page. **All prompts are displayed in plain English in neat colored windows (see display above).** The current column number, line number, page number and percentage of free memory is displayed on the screen at all times. The program even **displays the bottom margin perforation** so you know where one page ends and the other begins. You can also change foreground/background color of screen and select menu and carriage return colors to suit your needs! Carriage returns can be visible or invisible. Word Power 3.1 runs at double clock speed and can be used with RGB/composite/monochrome monitors as well as TV.

AVAILABLE MEMORY

No other word processor gives you so much memory. Word Power 3.1 gives you **over 72K** on a 128K machine and **over 450K** on a 512K machine to store text.

EDITING FEATURES

Word Power 3.1 has one of the **most powerful and user-friendly full-screen editors with word-wrap.** All you do is type. Word Power 3.1 takes care of the text arrangement. It even has a built-in **Auto-Save** feature which saves the current text to disk at regular intervals; so you know that your latest version is saved to disk. Here are some of the impressive editing features of Word Power 3.1:

Insert/Overstrike Mode (Cursor style changes to indicate mode); OOPS recall during delete; **Type-ahead buffer** for fast typers; Key-repeat (adjustable) and Key-click; Four-way cursor control and scrolling; Cursor to beginning of text, end of text, beginning of line, end of line, top/bottom of screen, next/previous word; Page up/down; Delete character, previous/next word, beginning/end of line, complete line, text before and after cursor; Locate/Replace with **wild-card search** with auto/manual replace; Block Mark, Unmark, Copy, Move and Delete; Line Positioning (Left/Center/Right); Set/Reset 120 programmable tab stops; Word count. Define left, right, top and bottom margins and page length. You can also highlight text (underline – with **on-screen underlining,** bold, italics, superscripts, etc). Word Power 3.1 even has a **HELP screen** which can be accessed any time during edit.

MAIL-MERGE

Ever try mailing out the same letter to 50 different people or sending out several resumes? Could be quite a chore. Not with Word Power 3.1. Using this feature, you can type a letter, follow it with a list of addresses and have Word Power 3.1 print out personalized letters. It's that easy!

SAVING/LOADING TEXT

Word Power 3.1 creates ASCII format files which are compatible with almost all terminal, spell-checking and other word-processing programs. It allows you to load, save, append and kill files and also to create and edit Basic, Pascal, C and Assembly files. You can select files by simply cursoring through the disk directory. Supports double-sided drives and various step rates.

PRINTING

Word Power 3.1 drives almost any printer (DMP series, EPSON, GEMINI, OKIDATA, etc). Allows print options such as baud rates, line spacing, page pause, partial print, page numbers, page number placement, linefeed option, multi-line headers/footers, right justification and number of copies (see display above). The values for these parameters and the margins can be changed anytime in the text by embedding Printer Option Codes. Word Power 3.1 has the **WHAT YOU SEE IS WHAT YOU GET** feature which allows you to preview the text on the screen as it will appear in print. You can see margins, page breaks, justification and more.

SPELLING CHECKER

Word Power 3.1 comes with a 50,000 word spelling checker/dictionary which finds and corrects mistakes within your text. You can add words to or delete from the dictionary or create a dictionary of your own.

PUNCTUATION CHECKER

This checker will **proofread your text for punctuation errors** such as capitalization, spaces after periods/commas, double words and much more. It's the perfect addition to any word processor.

DOCUMENTATION

Writing with Word Power 3.1 is a breeze. Word Power 3.1 comes with a well-written, easy-to-comprehend instruction manual which will lead you step-by-step through the program.

Word Power 3.1 comes on an UNPROTECTED disk and is compatible with RS DOS 1.0/1.1 and ADOS. Only $79.95.

(Word Power 3 owners can get the 3.1 version by sending proof of purchase and $10.00 to cover the cost of shipping and the manual.)

MICROCOM SOFTWARE
P.O. Box 214
Fairport, NY 14450
Phone (716) 223-1477

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How To Read Rainbow

When we use the term CoCo, we refer to an affectionate name that was first given to the Tandy Color Computer by its many fans, users and owners.

The BASIC program listings printed in THE RAINBOW are formatted for a 32-character screen — so they show up just as they do on your CoCo screen. One easy way to check on the accuracy of your typing is to compare what character "goes under" what. If the characters match — and your line endings come out the same — you have a pretty good way of knowing that your typing is accurate.

We also have "key boxes" to show you the *minimum* system a program needs. But, *do* read the text before you start typing.

Finally, the little disk and/or cassette symbols on the table of contents and at the beginning of articles indicate that the program is available through our RAINBOW ON DISK or RAINBOW ON TAPE service.

Using Machine Language

The easiest way to "put" a machine language program into memory is to use an editor/assembler, a program you can purchase from a number of sources. All you have to do, essentially, is copy the relevant instructions from THE RAINBOW's listing into CoCo.

Another method of putting an ML listing into CoCo is called "hand assembly" — assembly by hand, which *sometimes* causes problems with `ORIGIN` or `EQUATE` statements. You ought to know something about assembly to try this.

Use the following program if you want to hand-assemble ML listings:

```
10 CLEAR200,&H3F00:I=&H3F80
20 PRINT "ADDRESS:";HEX$(I);
30 INPUT "BYTE";B$
40 POKE I, VAL("&H"+B$)
50 I=I+1:GOTO 20
```

This program assumes you have a 16K CoCo. If you have 32K, change the `&H3F00` in Line 10 to `&H7F00` and change the value of `I` to `&H7F80`.

OS-9 and RAINBOW ON DISK

The OS-9 side of RAINBOW ON DISK contains two directories: `CMDS` and `SOURCE`. It also contains a file, `read.me.first`, which explains the division of the two directories. The `CMDS` directory contains executable programs and the `SOURCE` directory contains the ASCII source code for these programs. BASIC09 programs will only be offered in source form so they will only be found in the `SOURCE` directory.

OS-9 is a very powerful operating system. Because of this, it is not easy to learn at first. However, while we can give specific instructions for using the OS-9 programs, you will find that the OS-9 programs will be of little use unless you are familiar with the operating system. For this reason, if you haven't "learned" OS-9 or are not comfortable with it, we suggest you read *The Complete Rainbow Guide to OS-9* by Dale Puckett and Peter Dibble.

The following is not intended as a course in OS-9. It merely states how to get the OS-9 programs from RAINBOW ON DISK to your OS-9 system disk. Use the procedures appropriate for your system. Before doing so, however, boot the OS-9 operating system according to the documentation from Radio Shack.

1) Type `load dir list copy` and press ENTER.
2) If you have only one disk drive, remove the OS-9 system disk from Drive 0 and replace it with the OS-9 side of RAINBOW ON DISK. Then type `chd/d0` and press ENTER. If you have two disk drives, leave the sytem master in Drive 0 and put the RAINBOW ON DISK in Drive 1. Then type `chd/d1` and press ENTER.
3) List the `read.me.first` file to the screen by typing `list read.me.first` and pressing ENTER.
4) Entering `dir` will give you a directory of the OS-9 side of RAINBOW ON DISK. To see what programs are in the `CMDS` directory, enter `dir cmds`. Follow a similar method to see what source files are in the `SOURCE` directory.
5) When you find a program you want to use, copy it to the `CMDS` directory on your system disk with one of the following commands:

One-drive system: `copy /d0/cmds/`*filename* `/d0/cmds/`*filename* `-s`

The system will prompt you to alternately place the source disk (RAINBOW ON DISK) or the destination disk (system disk) in Drive 0.

Two-drive system: `copy /d1/cmds/`*filename* `/d0/cmds/` *filename*

Once you have copied the program, you execute it from your system master by placing that disk in Drive 0 and entering the name of the file.

The Rainbow Seal

RAINBOW
CERTIFICATION
SEAL

The Rainbow Certification Seal is our way of helping you, the consumer. The purpose of the Seal is to certify to you that any product that carries the Seal has actually been seen by us, that it does, indeed, exist and that we have a sample copy here at THE RAINBOW.

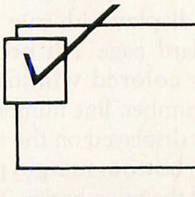
Manufacturers of products — hardware, software and firmware — are encouraged by us to submit their products to THE RAINBOW for certification.

The Seal is not a "guarantee of satisfaction." The certification process is different from the review process. You are encouraged to read our reviews to determine whether the product is right for your needs.

There is absolutely no relationship between advertising in THE RAINBOW and the certification process. Certification is open and available to any product pertaining to CoCo. A Seal will be awarded to *any* commercial product, regardless of whether the firm advertises or not.

We will appreciate knowing of instances of violation of Seal use.

Rainbow Check Plus



The small box accompanying a program listing in THE RAINBOW is a "check sum" system, which is designed to help you type in programs accurately.

Rainbow Check PLUS counts the number and values of characters you type in. You can then compare the number you get to those printed in THE RAINBOW. On longer programs, some benchmark lines are given. When you reach the end of one of those lines with your typing, simply check to see if the numbers match.

To use *Rainbow Check PLUS*, type in the program and save it for later use, then type in the command `RUN` and press ENTER. Once the program has run, type `NEW` and press ENTER to remove it from the area where the program you're typing in will go.

Now, while keying in a listing from THE RAINBOW, whenever you press the down arrow key, your CoCo gives the check sum based on the length and content of the program in memory. This is to check against the numbers printed in THE RAINBOW. If your number is different, check the listing carefully to be sure you typed in the correct BASIC program code. For more details on this helpful utility, refer to H. Allen Curtis' article on Page 21 of the February 1984 RAINBOW.

Since *Rainbow Check PLUS* counts spaces and punctuation, be sure to type in the listing exactly the way it's given in the magazine.

```
10 CLS:X=256*PEEK(35)+178
20 CLEAR 25,X-1
30 X=256*PEEK (35)+178
40 FOR Z=X TO X+77
50 READ Y:W=W+Y:PRINT Z,Y;W
60 POKE Z,Y:NEXT
70 IFW=7985THEN80ELSEPRINT
   "DATA ERROR":STOP
80 EXEC X:END
90 DATA 182, 1, 106, 167, 140, 60, 134
100 DATA 126, 183, 1, 106, 190, 1, 107
110 DATA 175, 140, 50, 48, 140, 4, 191
120 DATA 1, 107, 57, 129, 10, 38, 38
130 DATA 52, 22, 79, 158, 25, 230, 129
140 DATA 39, 12, 171, 128, 171, 128
150 DATA 230, 132, 38, 250, 48, 1, 32
160 DATA 240, 183, 2, 222, 48, 140, 14
170 DATA 159, 166, 166, 132, 28, 254
180 DATA 189, 173, 198, 53, 22, 126, 0
190 DATA 0, 135, 255, 134, 40, 55
200 DATA 51, 52, 41, 0
```

COCO 3 UTILITIES GALORE

(All utilities support 40/80 columns for CoCo 3)
(CoCo 2 versions are available for most utilities)

SUPER TAPE/DISK TRANSFER

- Disk-to-Disk Copy (1-3 passes)
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- Tape-to-Disk Automatic Relocate
- Disk-to-Tape Copy
- Tape-to-Tape Copy

Copies Basic/ML programs and DATA files. CoCo 1, 2 & 3. 32K Disk System (Disk to Disk Copy requires 64K). Disk Only **$24.95**

OS9 LEVEL II RAMDISK

Lightning Fast Ramdisk with Auto Formatting. A must for any OS9 Level II User. Req. 512K **$29.95.** (Only $14.95 with the purchase of 512K Upgrade & Ramdisk!!).

HI-RES JOYSTICK SOFTWARE

Wish you could use the hi-res joystick interface from Basic? You can now. This program will let you access 640 x 640 pixels from your joystick for extra precision. CoCo 3 Disk **$14.95**

COCO NEWSROOM

Now available for the CoCo III! You can design your own newspaper with Banner Headlines/6 articles using sophisticated Graphics, Fonts and Fill Patterns. Comes with 22 fonts & 50 pictures! Over 140K of code. Disk only **$49.95**

MAILLIST PRO

The ultimate mailing list program. Allows you to add, edit, view, delete, change, sort (by zipcode or name) and print labels. Its indispensible! Disk Only **$19.95** (CoCo 2 version included)

DISK LABEL MAKER

Allows you to design professional disk labels! Allows elongated, normal and condensed format for text, double-strike, border creation and multiple-label printing. Its a MUST for any user with a disk drive. Disk Only **$19.95.** Supports DMP 105/110/120/130/430, GEMINI, STAR, EPSON and compatibles. (CoCo 2 version included)

COMPUTERIZED CHECKBOOK

Why bother with balancing your checkbook? Let the CoCo do it for you! Allows you to add, view, search, edit, change, delete and printout (in a table or individual entry format) checkbook entries. Updates balance after each entry. Allows files for checking, saving and other accounts. Disk Only **$19.95** (CoCo 2 version included)

BOWLING SCORE KEEPER

An excellent utility to keep track of your bowling scores. Allows you to save scores under individuals or teams. You can edit, change, delete and compare scores. A must for anyone who wants to keep track of his or her bowling performance. Disk **$19.95** (CoCo 2 version included).

VCR TAPE ORGANIZER

Organize your videocassettes with this program! Allows you to index cassettes by title, rating, type, play time and comments. Also allows you to sort titles alphabetically and view/print selected tapes. If you own a VCR, this program is a must. Disk Only **$19.95** (CoCo 2 version included).

SCREEN DUMP

NEW

32, 40, 80 column text dump, PMODE 4 Graphics Dump. Single Keystroke Operation allows you to take snapshots of screens even when programs are running! Works on DMP's, Epson and Gemini. CoCo 1, 2 and 3. Disk Only **$24.95**

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Let the CoCo keep track of your bills. Allows you to enter bills under various categories and reminds you when they are due. Disk Only. **$19.95**

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Generate monthly calendars on your printer for any year in the 20th century. Disk Only. **$19.95**

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(Latest Version): Transfer CoCo Disk files to IBM compatible computer. Transfer MS-DOS files to CoCo. Req. 2-Drive IBM compatible. **$39.95**

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Makes a BACKUP of ANY disk. **$32.95**

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Advanced Disk Operating System for CoCo 3. **$34.95 ADOS $27.95**

RGB PATCH

Displays most games in color on RGB monitors. For CoCo 3 Disk. **$24.95**

All orders $50 and above shipped by UPS 2nd Day Air within Continental US at no extra charge. No CODs. We accept Visa, MC, Amex, Check or MO. Please add $3.00 S&H (USA/Canada). Other countries $5.00 S&H. NYS residents please add sales tax.

OS 9 PRODUCTS

OS 9 LEVEL II OPERATING SYSTEM

NEW

Supports 512K RAM dual speed, multi-tasking, multiple windows and more! Comes with disk and complete documentation. Only **$89.95**

MULTI-VUE

User friendly graphics interface with multiple "window" applications for Level II. Only **$54.95**

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OS9 Level II Terminal Package with 300-19200 baud rate and windowing capability. Requires 512K and RS-232 Pack. Only **$79.95**

SCREEN STAR

Best OS9 Word Processor. Implements WordStar (R) editing capabilities. Even has a built in spelling checker. Use with OS-9 Text Formater to get beautiful printouts. For OS9 Level 1 and 2. Disk Only **$49.95. OS-9 Text Formatter: Printout beautiful documents from any ASCII file. Only $34.95. Both Screen Star and OS-9 Text Formatter: $74.95**

DATA MASTER

Excellent database for OS9. Features include: windows, pull down menus, sorting, etc. Requires OS9 Level II & 512K. Only **$64.95**

PC-Xfer UTILITIES

NEW

Programs to format and transfer files to/from MS-DOS diskettes on CoCo Under OS9 Level 1 or 2. Requires SDISK or SDISK3. Only **$44.95**

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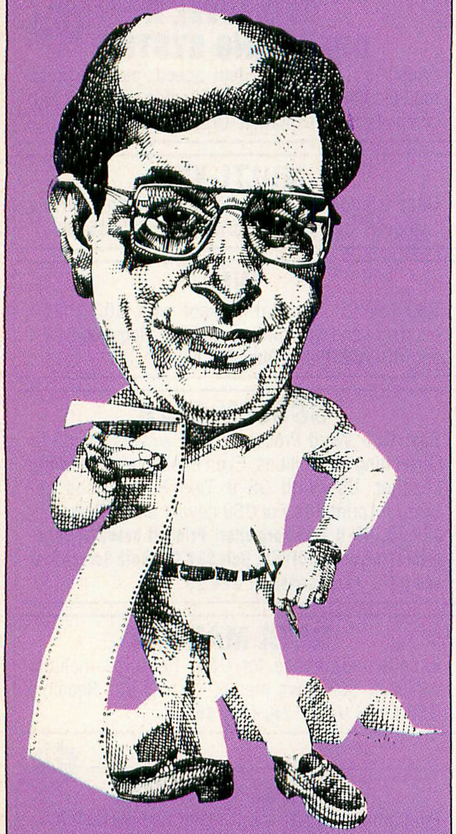

The CoCo vs. CoCo Controversy

The most often-received letters we get here at THE RAINBOW concern what I have decided to dub the CoCo vs. CoCo Controversy (CCC, but *not* the Civilian Conservation Corps — youngsters, read your American history textbooks).

Indeed, we get a lot of letters from people who say that we devote too much space to the CoCo 3 and not enough to the CoCo 1 and 2. Interestingly, we also get a lot of letters (something like the same number by my count) from people who say we devote too many pages to CoCo 1 and 2 and not enough to CoCo 3.

Every once in a while, one member of the editorial corps walks into my office or corners me at the Pepsi machine and allows how he or she is concerned about this letter or that. Ideas of all sorts have been advanced.

I'm not too worried, and here's why.

Back in what my children consider the dawn of recorded history (something like about the time Cro-Magnon Man was taking over from the Neanderthals, when I was young) I worked for United Press International, running the state news operation in Alabama during a particularly intense Democratic gubernatorial primary year.

There were people running from out of the woodwork all over, but the two big candidates were the incumbent, Albert Brewer, and former Gov. George Wallace — who were really slugging it out. The race had some national political implications, since Wallace (this was before the attempt on his life that left him confined to a wheelchair) was certain to run for president again if he was elected to another term as governor.

About a dozen other candidates were in the field, but Alabama has a runoff rule — the top two vote-getters go head-to-head in a second primary a few weeks later if no one gets a majority in the first election.

So, it was really a Brewer-Wallace race. Everyone knew it except, of course, some of the more obscure "other" candidates.

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We did individual stories on the three or four leading candidates twice a day (once for morning and once for afternoon newspapers) and updates almost hourly for broadcast stations. We also did one roundup story that tried to incorporate all the "doings" of the day for all the candidates.

It was, I recall, about six weeks before the first primary that I started to get telephone calls. Interestingly, both the Wallace camp and the Brewer camp started calling at the same time; and both had essentially the same thing to say. That was, "We've been reading these stories in the paper here and we see that you're giving more attention to the other guy." One of the sides — I won't tell you which — even added inches of copy over a week's period and found that the opponent had five inches more "coverage" than his candidate.

I admit I was a little flustered. These calls were coming every other day or so, and I knew we were trying to be fair and balanced. Finally, I put in a call to my division news manager in Atlanta, asking for his opinion.

"Both sides are complaining," he said. "That's good. It means you're doing what you should be doing — balancing things out. If one side was complaining and the other side was quiet, then I'd think that, maybe, the side that was complaining might have something to complain about."

> **"Both sides are complaining," he said. "That's good. It means you're doing what you should be doing — balancing things out."**

He added, of course, that they were reading all our stories in Atlanta, too, and re-sending them for the national news report. Had they "detected bias," there was little question we would have already heard about it.

It was a good lesson for me to learn, and I've honestly applied it ever since. When people here ask me about the CCC, I tell 'em the story.

I do think we are doing a good job in providing support for all the CoCos, no matter which one you have. Yes, I look through the issues to see if there is any indication of slighting one or the other. I don't really see it.

Of course, we are dependent on your sending us submissions for programs to include in THE RAINBOW. So, if you want to enhance coverage of a specific Color Computer, send us something we can use.

No, I do not think this will still the CCC. But I hope it offers some insight.

— Lonnie Falk

One-Liner Contest Winner . . .

This short verification program is used after initializing a new disk to verify that all sectors are intact. You can also check older disks that have programs stored on them. After running this one-liner, enter the desired track you want to start reading a disk from. If a "bad" sector is encountered, an I/O Error is given along with the offending sector number.

The listing:

```
1 CLEAR400:CLS:PRINT"DISK VERIFY
 1.0",,"(C) 1985 BRUCE K. BELL",
,,:PRINT"INSERT TARGET DISK.":IN
PUT"BEGIN WITH TRACK #";Q:FORT=Q
 TO34:PRINT@96,"TRACK="T:FORS=1T
O18:PRINT@128,"SECTOR="S:DSKI$0,
T,S,A$,B$:NEXTS,T:PRINT:PRINT"DI
SK IS GOOD!":CLEAR200:END
```

Bruce K. Bell
Rockmart, GA

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

One-Liner Contest Winner . . .

This one-liner will graph any function passed to it from within the program. Just change `Y=SIN(X)` to any other form of $y=x$. If you don't want the graphics to vanish upon completion, add another line. Also, to use longer equations (such as $y=sin(x)+cos(x)+x*x/35+abs(x-10)+10$), divide the program into more lines.

The listing:

```
10 Q=6.28:PMODE4,1:PCLS:SCREEN1,
1:DRAW"BM96,0M96,192BM0,96M192,9
6BM0,96":FORX=-Q TOQ STEP(2*Q)/1
92:E=INT((X+Q)*192/(2*Q)):Y=SIN(
X):F=INT((-1*Y+Q)*192/(2*Q)):IFF
>192THENLINE-(E,192),PSET:NEXTEL
SEIFF<0THENLINE-(E,0),PSET:NEXTE
LSELINE-(E,F),PSET:NEXT
```

Paul Keller
Wayne, PA

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

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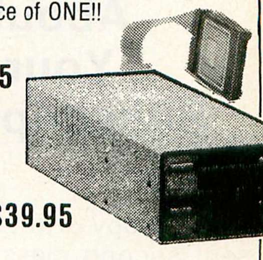
Double Sided Double Density 360K 40 Track ½ Ht Disk Drives for CoCo 2 and 3. Buy from someone else and all you get is a disk drive. Buy from us and not only do you get a quality disk drive but also $60 worth of disk utility software (Super Tape/Disk Transfer and Disk Tutorial) and our DISKMAX utility which allows you to use BOTH sides of our disk drives. Its like buying TWO disk drives for the price of ONE!!



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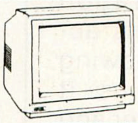

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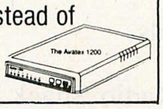

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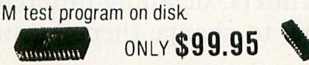

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Building May's Rainbow

The Best Is Yet to Come

Time is a precious commodity in this pressurized, deadline-intensive world of magazine publishing. Emphasis is often placed on the next day, rather than the next issue. However, John Crawley's appointment as editorial director of Falsoft has relieved me of my duties as production coordinator, and as a result, I am free to devote even more of my attention to improving THE RAINBOW and implementing many of the excellent ideas and suggestions that have come my way since taking over as managing editor. Here is just a sampling of what you can expect in the months ahead:

- Fewer articles and programs devoted to the monthly thematic schedule, allowing more space for at least one game, graphics, music, utility and educational program in each issue
- An entertainment column, featuring CoCo-generated puzzles, contests, etc.
- More assembly and machine language programming and tutorials
- More technical information on the CoCo 3 (e.g., memory maps, bugs, patches and fixes, etc.)
- More OS-9 programs and tutorials
- Programming and uses for the Radio Shack Appliance and Light Controller
- Tutorials on drawing Hi-Res graphics pictures
- A cross-reference to the many various printers, detailing different printer codes, what they represent, and how to change them to suit different brands of printers
- A question-and-answer column to help readers with specific BASIC programming problems

Although plans are only at the preliminary stage, I'll be discussing these topics and many others with writers and programmers in the CoCo Community this month at RAINBOWfest-Chicago. Hope to see you there!

— Jutta Kapfhammer

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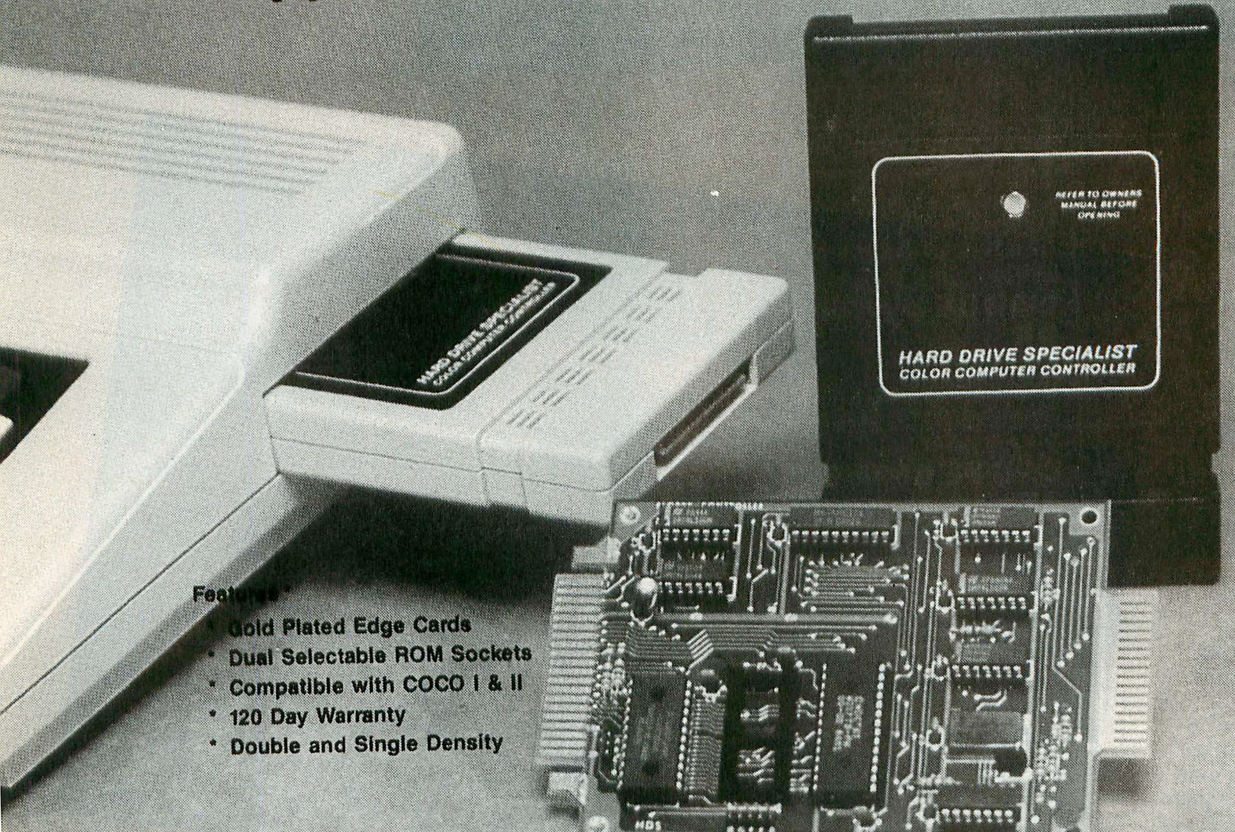
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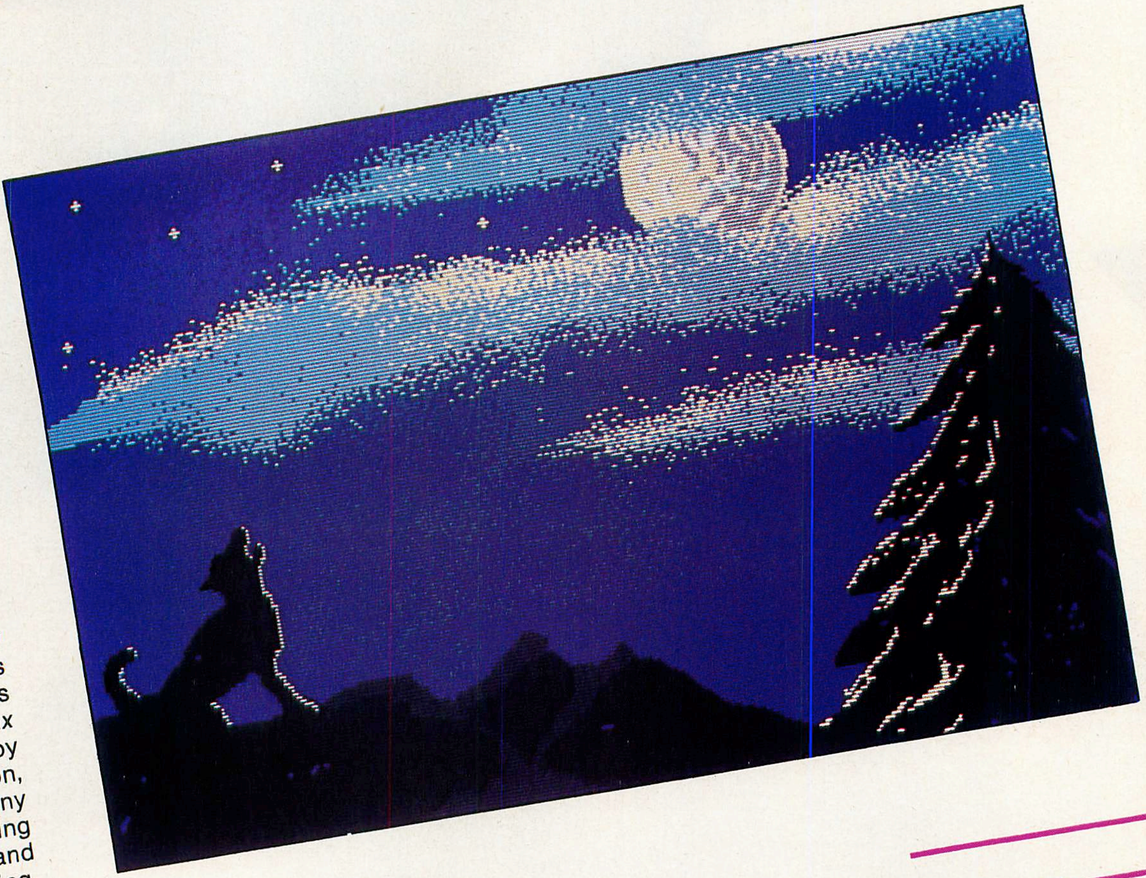
The CoCo Gallery

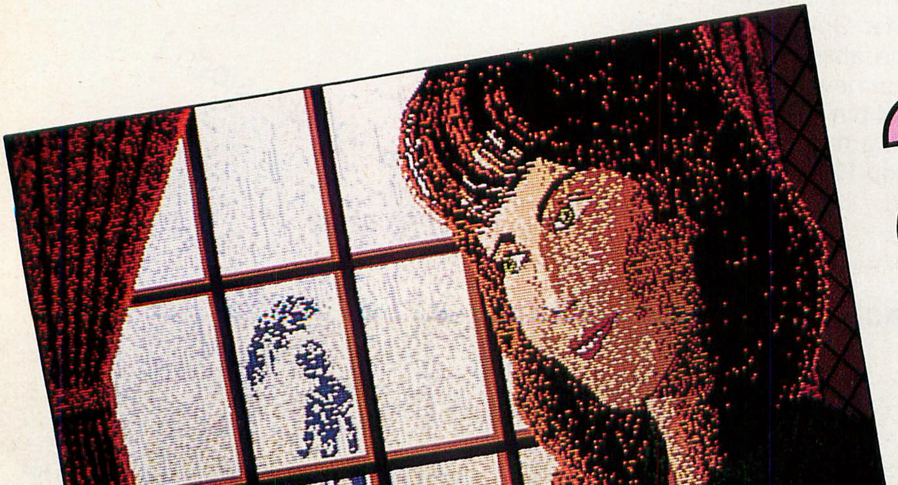
1st

COCO 3

Coyote
Wally Mayes

This breathtaking view from the western prairies of North America was created with *CoCo Max III*. Wally, a machinist by trade, lives in Hamilton, Ohio, and has many hobbies, including archery, horseshoes and leather tooling.





2nd

Rainy Day
James A. Upperman

James, of Amlin, Ohio, used CoCo 3 BASIC and a utility he is developing to create this distinct illustration.

SHOWCASE YOUR BEST! You are invited to nominate original work for inclusion in upcoming showings of "CoCo Gallery." Share your creations with the CoCo Community! Be sure to send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.) and how to display it. Also, please include a few facts about yourself.

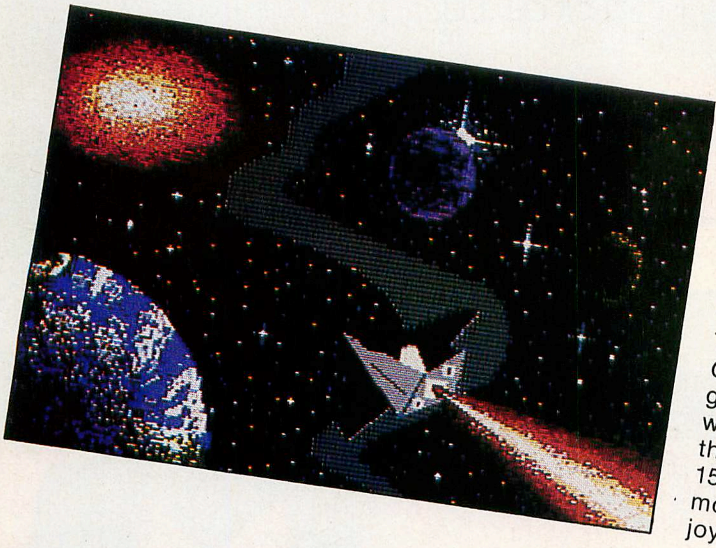
Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is *not* an original work.

We will award two first prizes of $25, one for the CoCo 3 and one for the CoCo 1 and 2; one second prize of $15 and one third prize of $10. Honorable Mentions may also be given.

Please send your entry on either tape or disk to the CoCo Gallery, THE RAINBOW, P.O. Box 385, Prospect, KY 40059. Remember, this is a contest and your entry will not be returned.

— Angela Kapfhammer, Curator

We are taking "CoCo Gallery" to RAINBOWfest Chicago! See Page 49 for details.



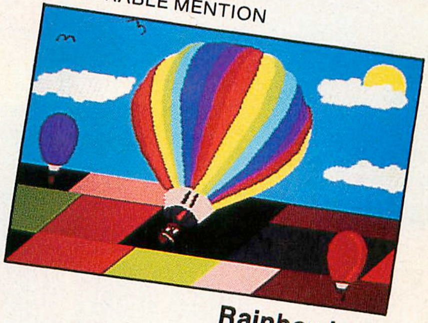
3rd

Hyper-Flight

Keith Schuler

The CoCo 3 and *CoCo Canvas*, a program Keith wrote, were used to create this depiction. He is 15 years old, races model cars and enjoys the CoCo 3.

HONORABLE MENTION



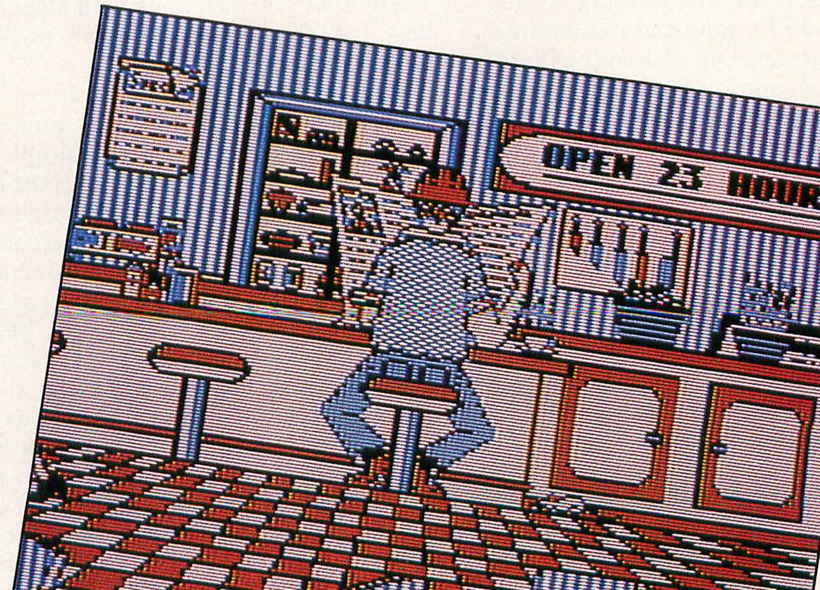
Rainbowloon

Logan Ward

Logan, of Memphis, Tennessee, used *Color Max 3* to develop this variegated scene.

1st

COCO 1 & 2



The Diner

Barry O'Brien

Barry, of St. Johns, Newfoundland, used *CoCo Max II* to illustrate this graphic. He is a self-taught programmer who enjoys sports and solving Adventure games.

A fast-paced action game . . .

STRATA

By Michael T. Sirolly

Greetings, and welcome to the colorful courts of *Strata*! You are about to take part in a challenging and elegant game of wall-bashing, an integral part of our long and rich heritage.

First, however, it might be helpful for you to become acquainted with the deceptively simple rules to our entertaining diversion. A ball will be introduced onto the court. This ball bounces off walls and destroys colored bricks on contact. If you play our rebound variation, the ball will be deflected by the bricks; otherwise, it will proceed straight through the wall. The court is open at the bottom; your goal is to keep the ball in play by rebounding it off the bat you control.

To further complicate matters, this bat, located near the exit, decreases in size should the ball reach the court's upper wall. Also, the ball's velocity increases whenever it comes into contact with one of the upper three layers of bricks. Every time you destroy all six rows of bricks, a new round begins with a new wall one row lower than before. There are even variations with smaller bats, faster action, and invisible bricks to make things really tough.

You receive points for each brick demolished. Your score is determined by the number of the round multiplied by the number of the brick's row (purple is Row 1, blue is Row 2, etc.). The game continues until five balls have left the court. Balls remaining, round number and score are listed on the screen's right. The right joystick controls your bat, while the red button is used to start games and release balls. Pressing the black button (on the Tandy Deluxe Joystick) or the space bar allows you to choose variations.

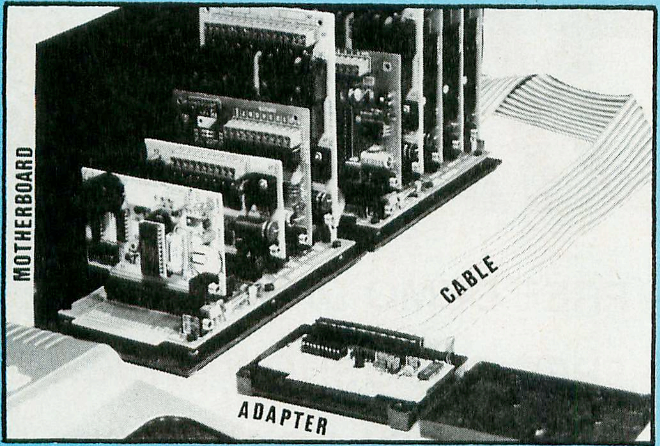
That's it! Extremely simple, yet extremely addicting. Now, prepare to enter the courts. Oh, and . . . good luck!

(Questions or comments regarding this program may be directed to the author at 1514 Woodhaven Drive, Hummelstown, PA 17036. Please enclose an SASE when requesting a reply.) □

Michael Sirolly recently laid to rest his six-year-old gray CoCo in favor of the sleeker CoCo 3. During infrequent but well-deserved breaks, he enjoys participating in drama, choral and instrumental groups.

The Amazing A-BUS

NEW



An A-BUS system with two Motherboards
A-BUS adapter in foreground
The A-BUS system works with the original CoCo, the CoCo 2 and the CoCo 3.

Plug into the future

With the A-BUS you can plug your PC (IBM, Apple, TRS-80) into a future of exciting new applications in the fields of control, monitoring, automation, sensing, robotics, etc.

Alpha's modular A-BUS offers a proven method to build your "custom" system today. Tomorrow, when you are ready to take another step, you will be able to add more functions. This is ideal for first time experimenting and teaching.

A-BUS control can be entirely done in simple BASIC or Pascal, and no knowledge of electronics is required!

An A-BUS system consists of the A-BUS adapter plugged into your computer and a cable to connect the Adapter to 1 or 2 A-BUS cards. The same cable will also fit an A-BUS Motherboard for expansion up to 25 cards in any combination.

The A-BUS is backed by Alpha's continuing support (our 11th year, 50000 customers in over 60 countries).

The complete set of A-BUS User's Manuals is available for $10.

About the A-BUS system:

- All the A-BUS cards are very easy to use with any language that can read or write to a Port or Memory. In BASIC, use INP and OUT (or PEEK and POKE with Apples and Tandy Color Computers)
- They are all compatible with each other. You can mix and match up to 25 cards to fit your application. Card addresses are easily set with jumpers.
- A-BUS cards are shipped with power supplies (except PD-123) and detailed manuals (including schematics and programming examples).

Relay Card RE-140: $129

Includes eight industrial relays, (3 amp contacts, SPST) individually controlled and latched. 8 LED's show status. Easy to use (OUT or POKE in BASIC). Card address is jumper selectable.

Reed Relay Card RE-156: $99

Same features as above, but uses 8 Reed Relays to switch low level signals (20mA max). Use as a channel selector, solid state relay driver, etc.

Analog Input Card AD-142: $129

Eight analog inputs. 0 to +5V range can be expanded to 100V by adding a resistor. 8 bit resolution (20mV). Conversion time 120us. Perfect to measure voltage, temperature, light levels, pressure, etc. Very easy to use.

12 Bit A/D Converter AN-146: $139

This analog to digital converter is accurate to .025%. Input range is −4V to +4V. Resolution: 1 millivolt. The on board amplifier boosts signals up to 50 times to read microvolts. Conversion time is 130ms. Ideal for thermocouple, strain gauge, etc. 1 channel. (Expand to 8 channels using the RE-156 card).

Digital Input Card IN-141: $59

The eight inputs are optically isolated, so it's safe and easy to connect any "on/off" devices, such as switches, thermostats, alarm loops, etc. to your computer. To read the eight inputs, simply use BASIC INP (or PEEK).

24 Line TTL I/O DG-148: $65

Connect 24 input or output signals (switches or any TTL device) to your computer. The card can be set for: input, latched output, strobed output, strobed input, and/or bidirectional strobed I/O. Uses the 8255A chip.

Clock with Alarm CL-144: $89

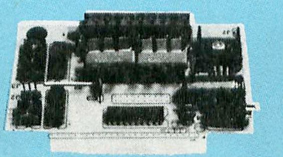
Powerful clock/calendar with: battery backup for Time, Date and Alarm setting (time and date); built in alarm relay, led and buzzer; timing to 1/100 second. Easy to use decimal format. Lithium battery included.

Touch Tone® Decoder PH-145: $79

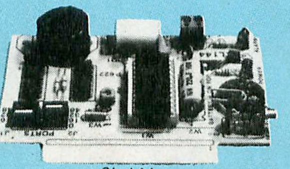
Each tone is converted into a number which is stored on the board. Simply read the number with INP or POKE. Use for remote control projects, etc.

A-BUS Prototyping Card PR-152: $15

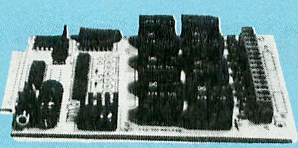
3½ by 4½ in. with power and ground bus. Fits up to 10 I.C.s



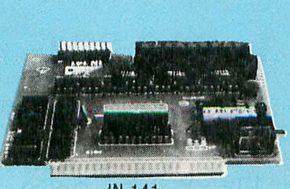
ST-143



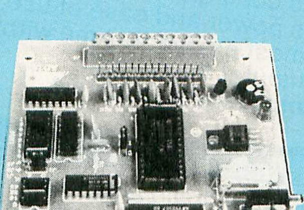
CL-144



RE-140



IN-141



AD-142

Smart Stepper Controller SC-149: $299

World's finest stepper controller. On board microprocessor controls 4 motors simultaneously. Incredibly, it accepts plain English commands like "Move arm 10.2 inches left". Many complex sequences can be defined as "macros" and stored in the on board memory. For each axis, you can control: coordinate (relative or absolute), ramping, speed, step type (half, full, wave), scale factor, units, holding power, etc. Many inputs: 8 limit & "wait until" switches, panic button, etc. On the fly reporting of position, speed, etc. On board drivers (350mA) for small steppers (MO-103). Send for SC-149 flyer.

Remote Control Keypad Option RC-121: $49
To control the 4 motors directly, and "teach" sequences of motions.

Power Driver Board Option PD-123: $89
Boost controller drive to 5 amps per phase. For two motors (eight drivers).

Breakout Board Option BB-122: $19
For easy connection of 2 motors. 3 ft. cable ends with screw terminal board.

Stepper Motor Driver ST-143: $79

Stepper motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with them. Each card drives two stepper motors (12V, bidirectional, 4 phase, 350mA per phase).
Special Package: 2 motors (MO-103) + ST-143: **PA-181: $99**

Stepper Motors MO-103: $15 or 4 for $39

Pancake type, 2¼" dia, ¼" shaft, 7.5°/step, 4 phase bidirectional, 300 step/sec, 12V, 36 ohm, bipolar, 5 oz-in torque, same as Airpax K82701-P2.

Current Developments

Intelligent Voice Synthesizer, 14 Bit Analog to Digital converter, 4 Channel Digital to Analog converter. Counter Timer, Voice Recognition.

A-BUS Adapters for:

IBM PC, XT, AT and compatibles. Uses one short slot.	AR-133...$69
Tandy 1000, 1000 EX & SX, 1200, 3000. Uses one short slot.	AR-133...$69
Apple II, II+, IIe. Uses any slot.	AR-134...$49
TRS-80 Model 102, 200 Plugs into 40 pin "system bus".	AR-136...$69
Model 100. Uses 40 pin socket. (Socket is duplicated on adapter).	AR-135...$69
TRS-80 Mod 3,4,4D. Fits 50 pin bus. (With hard disk. use Y-cable).	AR-132...$49
TRS-80 Model 4P. Includes extra cable. (50 pin bus is recessed).	AR-137...$62
TRS-80 Model I. Plugs into 40 pin I/O bus on KB or E/I.	AR-131...$39
Color Computers (Tandy). Fits ROM slot. Multipak. or Y-cable.	AR-138...$49

A-BUS Cable (3 ft, 50 cond.) CA-163: $24

Connects the A-BUS adapter to one A-BUS card or to first Motherboard.
Special cable for two A-BUS cards: CA-162: $34

A-BUS Motherboard MB-120: $99

Each Motherboard holds five A-BUS cards. A sixth connector allows a second Motherboard to be added to the first (with connecting cable CA-161: $12). Up to five Motherboards can be joined this way to a single A-BUS adapter. Sturdy aluminum frame and card guides included.

- The A-BUS is not a replacement for the Multi-pak

Add $3.00 per order for shipping.
Visa, MC, checks, M.O. welcome.
CT & NY residents add sales tax.
C.O.D. add $3.00 extra.
Canada: shipping is $5
Overseas add 10%

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SPECIAL

WITH YOUR
COCO MAX III ORDER:

- FREE DEMO DISK
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CoCo Max™ III

must be the most enjoyable, useful, and awesome program you've ever seen or your money back. Instantly, no questions asked.

CALL NOW TOLL FREE 1–800 221 Mon–Fri 9 to 5 EST **AND LET THE FUN BEGIN**

A FEW QUOTES :

An outstanding program that almost turns your CoCo into a replica of the Macintosh. Terrific hi-res color, very easy to learn and use.
- Family Computing

There is absolutely nothing else on the Color Computer that is comparable to CoCo Max's power and ease of use. The most enjoyable time with a computer I ever had.
- Computerware Review

I never expected to see anything like it on my CoCo screen. There isn't a single command to remember. Even a person who has no drawing ability like myself can create a presentable picture. I've spent hours just doodling enjoying all the things from silly to the serious. Fascinating experience. Buy it, you won't be sorry.
- 6809 Express

In Everyone's book, CoCo Max is rated again and again as the most incredible product ever marketed for the CoCo.
–CoCo America Club

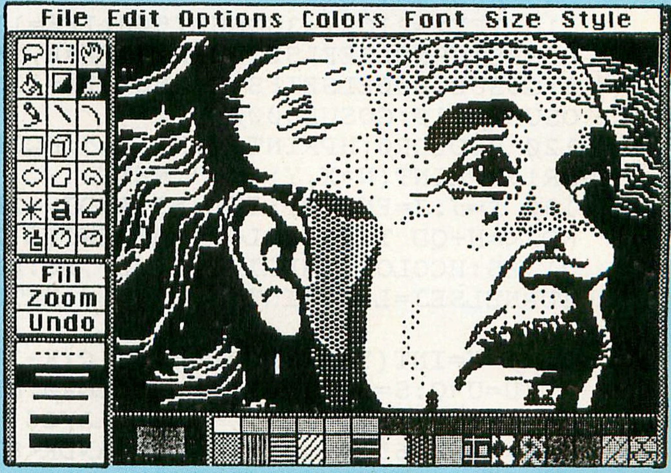
Note: *There is only one CoCo Max III.* Do not confuse COLORWARE's *CoCo Max* with similar sounding imitations.

INTRODUCING THE NEXT GENERATION: CoCo Max™ III*

More Resolution More Power More Color Built-in Animation More Speed More Type Styles More Tools Amazing Color Sequencing

"The best program ever written for the Color Computer"

That's how thousands of enthusiastic users rated the **CoCo Max II** drawing program. With **CoCo Max III** we are ready to amaze them again. Instead of "patching" CoCo Max II, we rewrote it from scratch to take advantage of the CoCo Max III hardware. The results will knock your socks off! Below is a brief list of some of the *new* features, but some, such as **animation, color sequencing**, or the **slide show,** have to be seen. Send for the Demo Disk, and see for yourself.



Imagine this picture in sixteen colors!

Everybody's favorite drawing package features:
- A 50% larger editing window. - Zoom area **400%** larger. - New drawing tools: **rays, 3D cubes, arcs,...** - New editing tools: shadow, text size,... - Rotate by 1.5° steps - Select any 16 of the 64 possible colors (all 64 colors displayed at once!) - Powerful **color mix**: additive, subtractive, overlay,... - Full **color editing** of patterns and color changing patterns. - Incredible **special effects** with **color cycling** up to 8 colors with variable speed. -**Animation** adds the dimension of motion to your image. (Must be seen.) - Sophisticated data compression saves up to 70% of disk space when saving pictures.
In addition, there are dozens of enhancements to the multitude of features that made CoCo Max II a best seller.

More about CoCo Max III
- CoCo Max III is not an upgrade of CoCo Max II. It is entirely rewritten to take advantage of the new CoCo 3 hardware (More memory, resolution, colors, speed,...)
- The new CoCo Max III **Hi-Res Interface** and the CoCo Max II **Hi-Res Pack** are *not* interchangable.
- The new interface plugs into the joystick connector.
- The CoCo Max III disk is not copy protected.
- CoCo Max III only works with the CoCo 3.
- A Y-Cable or Multi-pak is not necessary.
- Colors are printed in five shades of gray.
- CoCo Max III can read CoCo Max II pictures.

Note: CoCo Max II (for the CoCo 2) is still available on disk ($79.95). CoCo Max I is still available on tape ($69.95). For details, refer to our double page ad in any *Rainbow* from January '86 to July '87

Toll Free operators are for orders only. If you need precise answers, call the **tech line.** (Detailled CoCo Max specs are included with the Demo Disk.)

**Add $3.00 per order for shipping.
Visa, MC, checks, M.O. welcome.
CT residents add sales tax.
C.O.D. add $3.00 extra.
Canada: shipping is $5
Overseas add 10%**

Technical info: **(203) 656-1806**
Orders only Except in CT **800 221-0916**
Connecticut orders: **(203) 348-9436**
All lines open weekdays 9 to 5 Eastern time

✱ Beware of inferior imitations that *DO NOT* include a Hi-Res Interface or charge extra for each utility.

Guaranteed Satisfaction
**Use CoCo Max for a full month.
If you are not delighted with it,
we will refund every penny.**

System Requirements:
Any CoCo 3 disk system with a Joystick or a Mouse.
We apologize to tape users, CoCo Max III needs the flexibility of a disk.

The **CoCo Max III** system includes: • The special Hi-Res interface (for your mouse or joystick) • The CoCo Max III disk • Many utilities: (To convert Max II pictures, Max colors, etc.) • A detailled User's Manual. Complete system; nothing else to buy. **CoCo Max III: $79.95***

WITH COUPON ONLY

FREE DEMO DISK

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Please include $2 to help defray Processing and Shipping costs. (Check, Money Order, etc. Sorry, no COD or Credit Cards). Coupon (or copy) must be mailled to:

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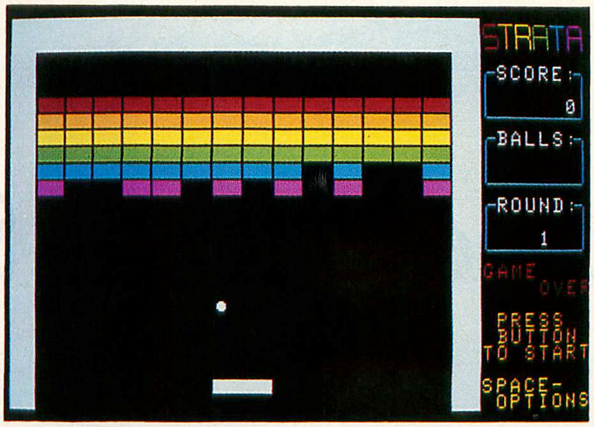
7540	90	10230	93
9500	72	20000	107
10010	184	50000	102
10036	74	50050	234
10110	146	END	24

The listing: STRATA

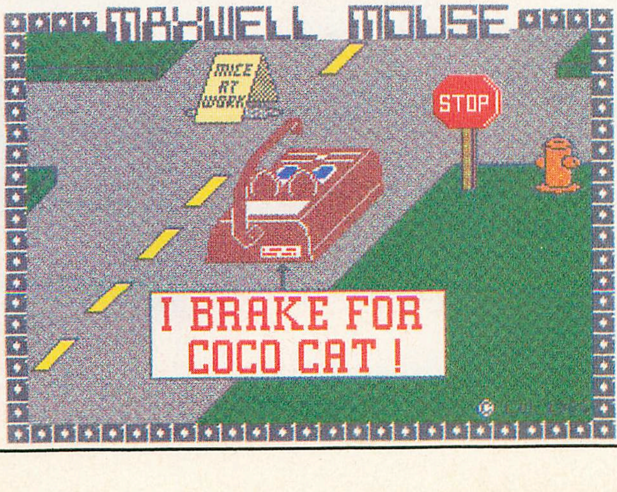
```
10 CLEAR900:GOSUB10000:GOSUB9000
99 GOSUB100:IFE=1GOTO10010ELSE99
100 FORM=0TOD:V=X:W=Y:X=X+T:Y=Y+
U:IFX<2ORX>=30THENT=-T:X=X+T+T:I
FN THENPLAY"C"
110 IFY>=21ORY<3GOSUB7500:IFE=1T
HENRETURNELSEELSEIFHPOINT(X*8,Y*
8)GOSUB7000ELSEIFS=G ANDW-F>=13G
OSUB10110:GOSUB8000
120 HCOLOR0:HPRINT(V,W),"%":HCOL
OR1:HPRINT(N*X,Y),"%":NEXT
190 L=J:J=FNJ(0):IFL<>J ANDJ>=2A
NDJ<=H+QD THENHCOLOR0:HPRINT(L,2
2),B$:HCOLOR1:HPRINT(J,22),B$:RE
TURNELSEJ=L:HPRINT(J,22),B$:RETU
RN
7000 K=INT(Y-F):POKE65466,C(K-3)
*I:U=U*Q:S=S+(11-K)*R:HCOLOR0:HP
RINT(INT(X/2)*2,Y),"#$":PLAYC$(1
2-K):POKE65466,0:IFD=BS-1ANDK<8T
HEND=BS:RETURNELSERETURN
7500 IFY>=24GOSUB9000:RETURNELSE
IFY<3THENIFH=0THENH=(PD-24+2)/2:
B$=SP$:HCOLOR0:HPRINT(J,22),LP$E
LSEELSEIFY<23ANDU>0ANDX>=J ANDX<
J-H+PD-22THENJ=J+.1:IFY=22THENY=
21:T=SGN(X):U=.5ELSEIFRND(3)=1TH
ENPLAY"C":ONRND(3)GOTO7510,7530,
7540ELSEELSERETURN
7501 J=J+.1:U=-U:PLAY"C":RETURN
7510 T=SGN(T)/2:U=-1:RETURN
7530 T=SGN(T):U=-1:RETURN
7540 T=-SGN(T):U=-ABS(U):RETURN
8000 O=K:K=Z:Z=O:FORA=2TO7:HCOLO
RI*10+A-I*A:HPRINT(2,F+A+3),"#$#
$#$#$#$#$#$#$#$#$#$#$#$":NEXT:
RETURN
9000 J=J+.1:H=0:D=BS-1:N=0:HCOLO
R0:HPRINT(V,W),"%":HCOLOR0:HPRIN
T(J,22),B$:J=2:B$=LP$:FORZ=1TO10
:GOSUB190:PLAY"O2CO4":NEXT:BL=BL
-1:IFP GOSUB9500:IFBL=-1THEN5000
0
9010 IFBUTTON(0)=0ANDP GOSUB190:
GOTO9010ELSEV=10:W=23:X=2+RND(5)
:Y=11+F:HCOLOR0:HPRINT(33+BL,9),
"%":HCOLOR1:HPRINT(X,Y),"%":XX=X
:YY=Y
9020 IFBUTTON(0)ANDP GOSUB190:GO
TO9020ELSEN=1:T=1:U=1:X=XX:Y=YY:
PLAY"V31":RETURN
9500 S=S-INT(S/1000000)*1000000:
PLAY"O5":HCOLOR1:VZ=V:WZ=W:OT=T:
OU=U:OD=D:NZ=N:XZ=X:YZ=Y:D=1:N=0
:LS=LEN(STR$(S)):FORYY=1TO0STEP-
1:FORXX=0TO9:HCOLORYY+RND(6)*YY:
PLAYSTR$(XX+1):HPRINT(40-LS,5),S
TRING$(LS-1,48+XX):HCOLOR-YY+1:H
PRINT(39-LS,5),S
9510 HCOLOR1:GOSUB190:NEXTXX,YY:
V=VZ:W=WZ:T=OT:U=OU:N=NZ:X=XZ:Y=
YZ:D=OD:PLAY"O4":RETURN
10000 ON BRK GOTO25000:DIMC$(12)
:POKE65497,0:WIDTH40:PALETTE0,0:
PALETTE11,63:CLS1:Q=-1:RP=1:LOCA
TE3,10:ATTR3,0:PRINT"Is this an
RGB color monitor? (Y/N)":ATTR2,
0:PRINT:DATA0,63,36,52,54,18,25,
45,18,56,0,0,63,24,38,52,33,29,2
6,33,32,0
10001 A$=INKEY$:IFA$="N"ORA$="n"
THENCS=16:GOSUB10006:GOSUB10007E
LSEIFA$="Y"THENCS=7:GOSUB10007:G
OSUB10006ELSE10001
10005 BS=1:QD=26:PD=QD:LP$="###$
":SP$="#$":PLAY"T255O5B":WIDTH40
:ATTR0,0:FORX=0TO31:READC:POKEX+
61621,C:NEXT:GOTO10010:DATA255,2
55,255,255,255,255,255,0,254,254
,254,254,254,254,254,0,0,0,28,62
,62,62,28,0,124,130,154,162,154,
130,124,0
10006 FORX=0TO10:READC:NEXT:FORX
=1TO12:C$(X)=STR$(X):NEXT:RETURN
10007 FORX=0TO10:READC(X):PALETT
EX,C(X):NEXT:RETURN
10010 ONBRK GOTO20000:E=0:GOSUB1
1000:FORX=2TO7:PALETTEX,0:NEXT:T
I$="C2R6EU4HL6HU4ER6C3BR2R8L4D12
BR6C4U12R7FD4GL7R6F2D4BR2C5U11ER
6FD5NL8D6BR6C6C6U12L4R8BR3C7R6FD
5NL8D6BL8U11E":FORX=0TO2:FORY=0T
O2:HDRAW"S20BM"+STR$(23+X)+","+S
TR$(100+Y)+TI$:NEXTY,X
10015 PLAY"T255L255O4":FORX=2TO7
:PALETTEX,C(X):SOUNDX*10,2:NEXT:
ST$="by Michael Sirolly":FORX=22
TO15STEP-1:HCOLOR0:HPRINT(11,X+1
),ST$:HCOLOR1:HPRINT(11,X),ST$:P
LAY"V20;"+STR$(25-X):NEXT
10020 OC=15:C=11:FORX=0TO39:PALE
TTEC,C(4):HCOLORC:HPRINT(39-X,23
),"%":HPRINT(X,0),"%":C=C+1:IFC=
16THENC=11:NEXTELSENEXT
10025 HCOLOR9:HPRINT(6,18),"vers
ion 1.0      & June, 1987":PLAY"V
31O4":FORX=1TO6:PLAY"CV-V-V-V-V-
":NEXT:PLAY"V31":T=100
10030 T=T-1:GOSUB11100:IFBUTTON(
0)GOTO10130ELSEIFBUTTON(1)ORINKE
```

```
Y$=" "GOTO10200ELSEIFT THEN10030
10035 IFHI$(1)<>""THENT=100:HCOL
OR15:Z$=STRING$(40,"%"):HPRINT(0
,0),Z$:HPRINT(0,23),Z$:FORX=1TO1
2:PALETTEX,0:NEXT:HCOLOR10:HPRIN
T(15,5),"TOP SCORES":HDRAW"S4C11
BM116,43L39GD96FR166EU96HL40"ELS
E10050
10036 PALETTE11,C(6):PALETTE12,C
(1):HCOLOR12:FORX=1TO10:IFHI$(X)
<>""THENST$=RIGHT$(STR$(X),2)+".
 "+HI$(X):HPRINT(10,6+X),ST$:NEX
TELSENEXT
10040 PALETTE10,RND(63):T=T-1:IF
BUTTON(0)GOTO10130ELSEIFBUTTON(1
)ORINKEY$=" "GOTO10200ELSEIFT TH
ENIF(T/10)-INT(T/10)>.4THENPALET
TE15,C(4):GOTO10040ELSEPALETTE15
,CS:GOTO10040
10050 S=0:R=1:F=0:GOSUB11200:HCO
LOR1:HPRINT(39-LEN(STR$(SP)),5),
SP:HPRINT(36-LEN(STR$(RP))/2,13)
,RP:P=0:DEF FNJ(K)=X+T:V=3:W=3:H
COLOR1,0:G=-1:BL=5:GOSUB9000:TI=
200
10055 S$="GAME        OVER
   PRESS   BUTTON TO START
  SPACE-   OPTIONS":FORZ=0TO8:HC
OLORZ/3+2:HPRINT(32,15+Z),MID$(S
$,1+Z*8,8):NEXT
10060 GOSUB100:IFBUTTON(0)GOTO10
130ELSEIFBUTTON(1)ORINKEY$=" "TH
EN10200ELSEIFS<60+Q*40GOTO10060E
LSE10010
10100 R=1:F=0:GOSUB11200:T=-1:S=
0:P=1:FORX=1TO5:HPRINT(32+X,9),"
%":PLAY"O5V31GV26GV21GV16GV11GV6
GV1GV31":NEXT:V=3:W=3:BL=5:R=0:D
EF FNJ(A)=INT(JOYSTK(0)/((PD-H)/
10)+2)
10110 HCOLOR0:HPRINT(34,13),"###
#":R=R+1:HCOLOR1:HPRINT(36-LEN(S
TR$(R))/2,13),R:G=294*R+S:F=R-1:
```



```
IFF>8THENF=8
10120 RETURN
10130 GOSUB10100:GOSUB9000:GOTO9
9
10200 HCLS0:FORX=0TO10:PALETTEX,
C(X):NEXT:HCOLOR1:HPRINT(16,7),"
OPTIONS:":HDRAW"S4C6BM124,59L15G
D62FR100EU62HL15"
10210 L=9:C1$="YES":C2$="NO":OP$
="REBOUND?":R$(0)="REBOUND.":R$(
1)="DEMOLISH.":GOSUB10250:Q=R:OP
$="VISIBLE?":R$(0)="VISIBLE.":R$
(1)="INVISIBLE.":GOSUB10250:I=(R
+1)/2
```

Mouse Tales By Logan Ward



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"QUEST FOR THE SPIRIT STONE" is an Adventure that will keep you playing for hours. It features single keystroke commands, 16 color graphics, 100% Hi-Res graphics screens, full game save, extensive playing area, level advancement, and the disk is not copy-protected. You choose your character's name, race, sex, and ability scores. The use of arrow keys simplify movement. This one is easy to play but a challenge to complete!

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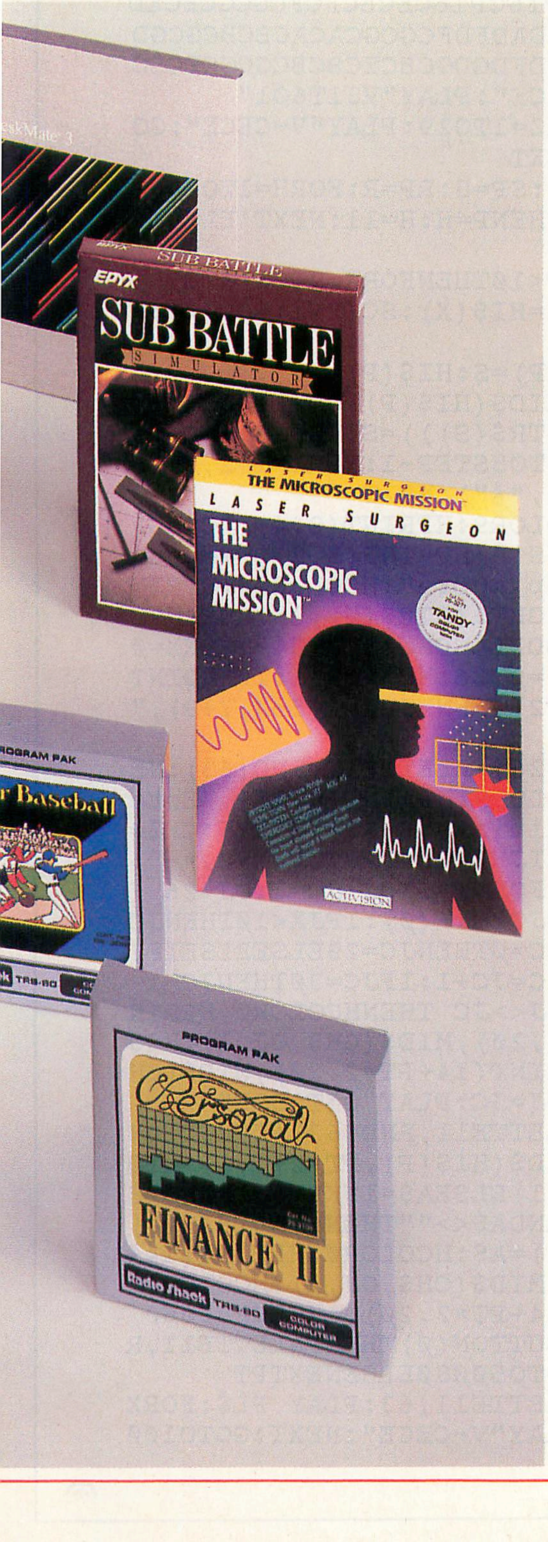

What a selection!

At Radio Shack, we're dedicated to making sure that you never run out of ways to use and enjoy your Color Computer. We've got a terrific line of software—here's just a sample.

Games for the whole family

Let your Color Computer open the door to fun and adventure. Radio Shack has a dazzling selection of various types of popular and challenging games.

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One of the greatest potential uses of your Color Computer is giving your child a head start in education. We've got programs that cover a variety of disciplines, and are fun, too!

Children will learn computer skills with *BASIC-O9 Tour Guide. The Color Computer Artist* may bring out the Van Gogh in your child! Geography is made easy in *Where in the World is Carmen Sandiego?* And *Microscopic Mission* lets your child explore the human body—from the inside out.

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You'll find your Color Computer is much more than a game computer. Our programming software lets you fully enjoy the benefits of owning a home computer, and designing and running your own programs.

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```
10215 OP$="SPEED?":C1$="SLOW":C2
$="FAST":R$(0)="SLOW SPEED.":R$(
1)="FAST SPEED.":GOSUB10250:BS=(
R+1)/2+1:OP$="PADDLES?":C1$="LAR
GE":C2$="SMALL":A$=" SIZE.":R$(0
)=C1$+A$:R$(1)=C2$+A$:GOSUB10250
10220 HCOLOR1:HPRINT(14,14),"PRE
SS BUTTON":IFR=1THENLP$="#$":SP$
="$":QD=28:PD=24ELSELP$="###$":S
P$="#$":QD=26:PD=QD
10230 IFBUTTON(0)ORBUTTON(1)ORIN
KEY$<>""THENHCLS0:GOTO10050ELSE1
0230
10250 HCOLOR1:HPRINT(15,L),OP$:P
ALETTE2,C(9):PALETTE3,C(9):HCOLO
R2:HPRINT(14,14),C1$:HCOLOR3:HPR
INT(26-LEN(C2$),14),C2$
10260 Z=RND(63):IFJOYSTK(0)<33TH
ENR=-1:P1=Z:P2=C(9)ELSER=1:P2=Z:
P1=C(9)
10270 PALETTE2,P1:PALETTE3,P2:IF
BUTTON(0)<>1THEN10260ELSEPLAY"T2
55O5B"
10280 IFBUTTON(0)THEN10280
10290 HCOLOR0:HPRINT(15,L),OP$:H
PRINT(14,14),C1$:HPRINT(26-LEN(C
2$),14),C2$:HCOLOR9:HPRINT(15,L)
,R$((R+1)/2):L=L+1:PALETTE2,C(2)
:PALETTE3,C(3):RETURN
11000 FORX=0TO15:PALETTEX,0:NEXT
:HSCREEN2:FORX=0TO10:PALETTEX,C(
X):NEXT:RETURN
11100 PALETTEC,C(4):PALETTEOC,CS
:OC=C:C=C+1:IFC=16THENC=11:RETUR
NELSERETURN
11200 GOSUB11000:FORX=1TO10:PALE
TTEX,0:NEXT:HDRAW"S4BM0,0C1D191R
14U174R226D174R15U191":HPAINT(1,
1),1:HDRAW"BM258,15"+TI$:GOSUB80
00
11210 S$="L4GD20FR54EU20HL4BL46B
D32":HDRAW"C6BM263,27"+S$+S$+S$:
HCOLOR1:HPRINT(33,7),"BALLS:":HP
RINT(33,11),"ROUND:":HPRINT(33,3
),"SCORE:":FORX=1TO10:PALETTEX,C
(X):NEXT:RETURN
20000 HCOLOR6,0:HSCREEN2:FORX=0T
O10:PALETTEX,C(X):NEXT:PALETTE13
,C(6):HDRAW"S4C13BM117,83L4GD22F
R92EU22HL4":HCOLOR1:HPRINT(15,10
),"QUIT GAME?":HCOLOR11:HPRINT(1
5,12),"YES":HCOLOR12:HPRINT(23,1
2),"NO"
20010 A=RND(63):IFJOYSTK(0)<33TH
ENC1=A:C2=C(9)ELSEC1=C(9):C2=A
20020 PALETTE11,C1:PALETTE12,C2:
IFBUTTON(0)THENIFJOYSTK(0)>32THE
N10010ELSEELSE20010
20030 A$=STRING$(40,"$"):PALETTE
13,0:FORX=1TO12:HCOLORX-INT((X-1
)/6)*6+1:HPRINT(0,12-X),A$:HPRIN
T(0,11+X),A$:NEXT:FORX=1TO12:HCO
LOR0:HPRINT(0,12-X),A$:HPRINT(0,
11+X),A$:NEXT
20040 FORX=0TO15:PALETTEX,0:NEXT
:WIDTH40:FORX=0TO8:PALETTEX,C(X)
:NEXT:POKE65496,0:END
25000 RUN
50000 HCOLOR2:HPRINT(32,15),"GAM
E":HPRINT(36,16),"OVER":HCOLOR1:
PL$="T6V20O2L16CP16CP16CP16CP16C
P16CP16CP16CP16CECECFCFCGCGCECED
FDFDGDGDADADFDFCGCGCACACBCBCGCGD
ADADGDGDFDFDGDGCECECBCBCGCGCECEC
BCBCGCGCECE":PLAY"V31T6O1"
50005 FORZ=1TO29:PLAY"V-CECE":GO
SUB190:NEXT
50010 E=1:SP=S:RP=R:FORH=1TO10:I
FS>SC(H)THENP=H:H=11:NEXT ELSENE
XT:RETURN
50020 IFP<10THENFORX=9TOP STEP-1
:HI$(X+1)=HI$(X):SC(X+1)=SC(X):N
EXT
50030 SC(P)=S:HI$(P)=". . . . .
. . . ":MID$(HI$(P),17-LEN(STR$(
S)),LEN(STR$(S)))=STR$(S):HCOLOR
0:FORX=23TO5STEP-1:HPRINT(2,X),S
TRING$(28,"#"):NEXT
50040 HCOLOR9:HPRINT(8,4),"CONGR
ATULATIONS!":HPRINT(5,7),"You ac
hieved top score":HCOLOR10:HPRIN
T(4,9),RIGHT$(STR$(P),2):HDRAW"B
M26,74R4BD2L4RDNU4BR2NU4":FORX=0
TO21:FORY=0TO6:HCOLOR11:IFHPOINT
(X+25,Y+72)THENHPRINT(5+X,Y+9),"
$"
50050 OJ=26:PALETTE11,RND(63):NE
XTY,X:HCOLOR9:HPRINT(6,17),"Ente
r your initials:":A$=INKEY$:CH$=
"ABCDEFGHIJKLMNOPQRSTUVWXYZ.*-":
HCOLOR11:FORPT=0TO2:JC=1:OJ=26
50060 JX=JOYSTK(0):IFJX<10THENJC
=JC-1:IFJC=0THENJC=29ELSEELSEIFJ
X>54THENJC=JC+1:IFJC=30THENJC=1
50065 IFOJ<>JC THENHCOLOR0:HPRIN
T(14+PT*2,20),MID$(CH$,OJ,1):HCO
LOR11:HPRINT(14+PT*2,20),MID$(CH
$,JC,1):OJ=JC:PLAY"O5T255B"
50070 PALETTE11,RND(63):IFBUTTON
(0)THENMID$(HI$(P),PT*2+1,1)=MID
$(CH$,JC,1)ELSEA$=INKEY$:IFINSTR
(CH$,A$)ANDA$<>""THENMID$(HI$(P)
,PT*2+1,1)=A$:HCOLOR0:HPRINT(14+
PT*2,20),MID$(CH$,OJ,1):HCOLOR11
:HPRINT(14+PT*2,20),A$ELSE50060
50080 IFBUTTON(0)THENPALETTE11,R
ND(63):GOTO50080ELSENEXTPT
50090 PALETTE11,63:PLAY PL$:FORX
=1TO20:PLAY"V-CECE":NEXT:GOTO100
10
```

Telewriter-128™

the Color Computer 3 Word Processor

For over 5 years now, Telewriter has been the #1 Color Computer word processor, both in popularity and in performance. Telewriter's near perfect mix of sophisticated professional features and a very natural user interface, has earned it the highest praise in numerous magazines, and an intensely loyal following among tens of thousands of Color Computer users all over the world.

HISTORY

Throughout the history of the Color Computer, Telewriter has pioneered software breakthroughs that set the standards.

In 1981, it was Telewriter 1.0 that first took the Color Computer's inadequate 32X16 all-uppercase display, and replaced it with a graphics-based 51X24 upper and lowercase display.

A few years later, Telewriter-64 added high density 64X24 and 85X24 displays and access to the full 64K of the newer Color Computers.

THE NEW AGE

Today, Telewriter-64 is recognized as the standard Color Computer word processor. It runs on all Tandy Color Computers — from the original Color Computer 1, to the Color Computer 2, and 3.

But the Color Computer 3 brings a whole new level of power to low cost computing and, so, a new Telewriter is here to put that power to work for you. We call it Telewriter-128.

TELEWRITER-128

You don't mess with a good thing, so Telewriter-128 is still Telewriter-64 at heart. The commands, and the user interface are essentially the same. If you know Telewriter-64, then you already know Telewriter-128. And, if you don't know Telewriter-64, you'll still have an easy time learning and using Telewriter-128.

80 COLUMNS

But there are major differences as well. First, Telewriter-128 uses the Color Computer 3's new 80 column screen display.

This means, simply, that using Telewriter-128 on a low cost Color Computer 3 will look a lot like using a more expensive word processor on a much more expensive IBM PC, PS/2, or clone.

SPEED

Second, Telewriter-128 is lightning fast. Telewriter-64 was fast in its own right, but, by accessing the Color Computer 3's video hardware directly, and by running the machine in double speed mode, Telewriter-128 is able to provide extremely fast scrolling and instant paging — functions whose speed is crucial to serious word processing.

In this department, Telewriter-128 doesn't simply keep up with IBM-based word processors — it generally surpasses them!

EASE

Third, Telewriter-128 adds a host of new features big and small, that make it even easier to use.

Features like: Quick function key access to the editor or the menus — an instant on-line help screen summarizing all Telewriter commands and special characters — an option file where you store your personal set of format and screen settings so you only have to set them once!

Then, there's a quick save feature which allows you to save all your current work without leaving the editor. There's a simple way to cursor through the disk directory and read in a file by just hitting ENTER. And there's more.

NEW POWER

Telewriter-64 always had the power to handle any kind of serious writing, from letters to textbooks. But, here too, Telewriter-128 adds major features. Like Macros — which let you insert whole words or phrases (even sets of control codes or format commands) into your text, with a single keypress. And every time you power up Telewriter-128, the macro definitions are automatically loaded*, so they're always there.

Then there's a Print Preview feature that shows you, on-screen, the way your printed text will look — with margins, headers, centering, justification, page numbering, and page breaks. This guarantees letter perfect documents every time, and makes tasks like widow/orphan line elimination, a breeze.

TELEWRITER-64 OR TELEWRITER-128

We could go on listing features, but the point is this: If you own a Color Computer, you already have the hardware for the most powerful, low cost word processor in town. All you need now is to add the heart and soul:

Telewriter-64, for the Color Computer 1 and 2, costs $59.95 on disk, $49.95 on cassette.

Telewriter-128 for the Color Computer 3 costs $79.95 on disk, $69.95 on cassette.

To order by Mastercard or Visa call (619) 755-1258 anytime, or send check or money order plus $2 shipping (Californians add 6% sales tax) to:

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To upgrade from Telewriter-64 to Telewriter-128, return your original disk or cassette with $39.95. (Add $10 if you're also upgrading from cassette to disk. Deduct $10 with proof of Oct '87 - Feb '88, purchase of Telewriter-64.)

> *When I first got Telewriter-64 last year, I was in heaven. I couldn't believe the program's versatility and ease of use.*
> -The RAINBOW, Oct. 1985

TELEWRITER-64 FEATURES: Compatibility with any printer that works with the Color Computer; embedded control codes for underlining, boldface, sub/superscript, variable fonts; format commands for headers, centering, margin and spacing changes anywhere in the document; Format menu to set margins, spacing, page numbering, BAUD rate, lines per page, justification; Chain printing for one shot printing of multi-file documents. Fast, full-screen editor with wordwrap, block copy/move/delete, global search and replace, wild card search, fast 4-way auto-repeat cursor, fast scrolling, forward and backward paging, text alignment, tabs, error protection, word and line counter. Insert or delete text anywhere on the screen. Simple, easy to remember commands. Optional ASCII files for compatibility with spell checkers, terminal programs, and BASIC. Load, save, append, partial save files to disk or cassette. Kill, rename and list disk files. Cassette verify and auto-retry on error.

TELEWRITER-128 - ADDITIONAL FEATURES: Print preview from editor; multiple copy print; footers; hanging indents; cursor thru disk directory to load, append, rename and kill files; quick file save from editor; keyclick; key repeat; true block move; 24, 25, or 28 line screen; 40 or 80 column screen; dual speed cursor; on-line help; overstrike mode; word delete; wordwrap at margin; user definable macros; nested macros; instant status window for information on cursor position, word count, etc.; instant function key access to menus or editor; options menu for setting character and screen colors, key repeat and delay rates, definable foreign symbols.

RAINBOW CERTIFICATION SEAL

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A strategy game for two players

One Good Turn Deserves Another

By Eric Tucker

You're leading your opponent by a score of 33 to 30, and it's his move. Only two spaces, E3 and G8, are left on the board. If he picks G8, it's all over for you. Tensely, you wait as he ponders his move. . . .

Flip It is a strategy game designed for a 16K CoCo 2 with Extended Color BASIC. Two people are needed to play.

The game board is an eight-by-eight grid, marked as 1-8 vertically and A-H horizontally. Four markers, two white and two black, are placed on the four center squares. The idea is to place your markers in such a way as to "sandwich" your opponent's markers between two of yours. For example, in Figure 1, a black marker is at B6. Going up diagonally, there are three white markers and a blank space. By placing a black

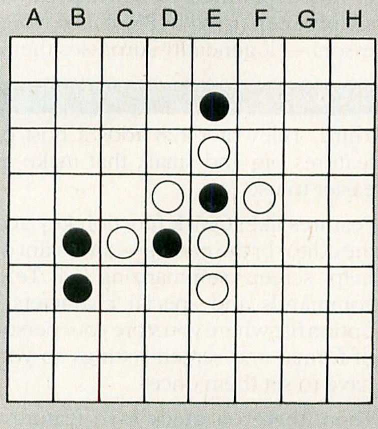

Figure 1

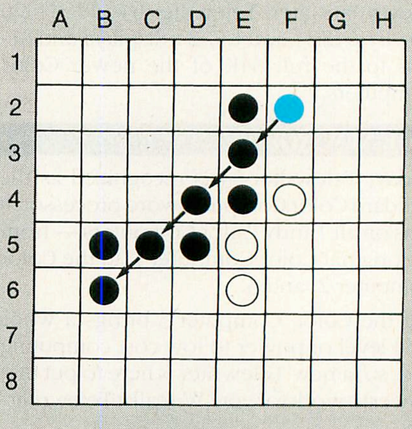

Figure 2

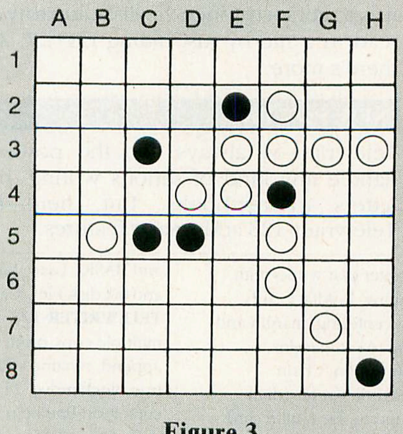

Figure 3

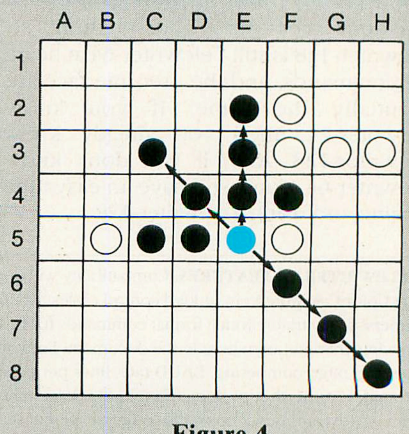

Figure 4

Eric Tucker is a student at Baruch College, where he is working on his bachelor's degree in computer science. He owns both the MC-10 and the CoCo, but his programming is done exclusively on the CoCo.

marker at F2, the white markers all "flip" to black (Figure 2).

More than one line can be flipped. In Figure 3, a black marker can be placed at E5. The white markers would be flipped in this order: north, two markers; southeast, two markers; and northwest, one marker. This results in Figure 4. As long as there is a marker of your opponent's color and one of your color opposite a blank space, you can move to that location. Whether horizontally, vertically, or diagonally placed, the markers in between will be flipped.

To type in your coordinates, just press a key. The screen will clear and ask you for the coordinates (letter, number). If you want to look at the board again before you make your move, just type `I,9`. The board will reappear, but it will still be your turn. If you type in coordinates that are already occupied, a beep will sound and you will be asked again for the coordinates.

In the upper left-hand corner, a small section of the playing board shows a marker, the color of which shows whose turn it is. The computer keeps track of both players' scores and displays them on the screen. *You must place your marker next to another.* Most of the time, you also have to be able to flip something. If either one of these rules is broken, your marker will not be placed on the screen and you will lose your turn. You cannot flip your own color, since it is already yours.

The game ends when either the board is filled or one marker color is wiped out. The winner is the one with the most markers on the board. Good luck!

(Questions or comments regarding this program may be directed to the author at 2950 Park Ave., Apt. 114, Bronx, NY 10451. Please enclose an SASE when requesting a reply.) □

90	79	740	132
150	66	900	243
370	121	1020	160
540	16	END	253

The listing: FLIPIT

```
10 REM **** FLIP IT ****
20 REM * BY ERIC TUCKER *
30 CLS:PRINT@64," ******* F L I
P   I T ******":PRINT@96,"((( DE
SIGNED BY ERIC TUCKER )))":PRINT
@192," TWO PEOPLE ARE NEEDED TO
PLAY.":PRINT@256,"       <<<<PRESS
 ENTER>>>>":EXEC44539
40 PMODE3:SCREEN1,0:POKE65314,24
8:PCLS2:CIRCLE(128,96),255,1,1,.
65,.35
50 LINE(180,0)-(182,191),PRESET,
BF:DRAW"C3":LINE(10,10)-(170,170
),PSET,BF
60 FORX=10TO170STEP20:LINE(X,10)
-(X,170),PRESET:NEXT:FORY=10TO17
0STEP20:LINE(10,Y)-(170,Y),PRESE
T:NEXT:CIRCLE(6,6),4,1:PAINT(6,6
),1,1
70 DRAW"C1BM10,8;BR6U6R4D6U3NL4D
3BR16U6R4D3L4R6D3NL6BR14U6NR4D6R
4BR16U6R2F2D2G2NL2BR18U6NR4D3NR4
D3R4BR16U6NR4D3R4BD3BR16U6NR6D6R
6U3NL2D3BR14U6D3R4U3D6"
80 DRAW"BM4,10BD4D6R2L4R2U5NL2D5
L2BD16R4D3L4D3R4BD16NL4D3NL4D3L4
BD14D3R4U3D6BD14L4D3R4D3L4BD14BR
4L4D6R4U3L4BD18R4D6BD12L4D6R4U6D
3L4C3"
90 LINE(200,10)-(240,30),PSET,BF
:LINE(210,10)-(210,30),PRESET:LI
NE(230,10)-(230,30),PRESET:LINE(
198,9)-(242,31),PRESET,B:LINE(18
0,40)-(255,42),PRESET,BF
100 DRAW"BM196,50C1D6R6U3L6R4U3N
L4BR6D6R6BR4U6R4D6U3NL4D3BR4NR4U
6R4BR4D6U3R2NE3F3BD4L40":LINE(18
0,80)-(255,82),PRESET,BF
110 DRAW"BM196,90D6R4NU4R4U6BR4D
6U3R4U3D6BR4U6BR4R4L2D6BR6NR4U3N
R4U3R4BD10L36":LINE(180,120)-(25
5,122),PRESET,BF
120 DRAW"BM192,130;ND6R4D3NL4BD3
BR4U6R4D3L4R3D2R1D1R2BR4NR4U3NR4
U3R4BR4NR4D3R4D3NL4BR4R4U3L4U3R4
BR12ND6R4D6U3L4BM204,140D6U3R2NE
3F3R1BR4NR4U3NR4U3R4BR4F4NE4D2"
130 DRAW"C4":LINE(204,150)-(228,
160),PSET,BF:LINE(204,150)-(228,
160),PRESET,B
```

TEXTFORM

TEXTFORM is compatible with all Color Computers with a minimum of 64K, disk drive, and printer. This machine language program will format ASCII text files into two column pages quickly and easily. This is not another word processor. TEXTFORM is a user defineable two column text formatter program which will allow your Color Computer to create very professional documents without hours of tedious work. TEXTFORM is a versitile enhancement to any word processing system whether you are a casual or professional user.

Price....$34.95 Special Thru May 31, 1988....$27.95

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RAINBOW CERTIFICATION SEAL

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```
140 CIRCLE(80,80),6,1:PAINT(80,8
0),1,1:CIRCLE(100,100),6,1:PAINT
(100,100),1,1:CIRCLE(80,100),6,4
:PAINT(80,100),4,4:CIRCLE(100,80
),6,4:PAINT(100,80),4,4:CIRCLE(2
20,20),6,1:PAINT(220,20),1,1:PC=
1
150 SD$="T6L64V30O1EEEV20EEEV15E
EEV10EEEV5EEE"
160 PAINT(220,20),PC,3:GOSUB890:
SOUND200,1:EXEC44539:CLS:IF BS+W
S=64THEN1000
170 IF BS=0 OR WS=0 THEN 1000
180 REM ask for input
190 IF PC=1 THEN PC=128 ELSE PC=
207
200 PRINT"USE 'I,9' TO LOOK AT B
OARD AGAIN":PRINT
210 PRINT"PLAYER: ";STRING$(5,PC
):IFPC=128THENPC=1ELSEPC=4
220 GOTO 240
230 SOUND10,10
240 INPUT"POSITION(LETTER,NUMBER
)";C$,R:SCREEN1,0:POKE65314,248
250 IF C$=""OR R=0THEN160
260 C=ASC(C$)-64
270 IF C=9 OR R=9 THEN 160
280 IF C<0 OR C>8 OR R<0 OR R>8
THEN 230
290 IF C=0 OR R=0 THEN 160
300 X=C*20:Y=R*20:IFPPOINT(X,Y)<
>3THEN230
310 CX=X:CY=Y:REM #1 check
320 REM #2 check--(N)
330 CY=CY-20:IF CY=0 THEN390
340 IFPPOINT(CX,CY)=3THEN390
350 IFPPOINT(CX,CY)<>PC THEN330E
LSE SX=CX:SY=CY:CX=X:CY=Y:CIRCLE
(X,Y),6,PC:PAINT(X,Y),PC,PC
360 CY=CY-20:IF CY=SY THEN 390
370 PLAY SD$
380 CIRCLE(CX,CY),6,PC:PAINT(CX,
CY),PC,PC:GOTO360
390 POKE65314,248:CX=X:CY=Y:REM
#2 check--(NE)
400 CY=CY-20:CX=CX+20:IF CY=0 OR
 CX=180 THEN 460
410 IFPPOINT(CX,CY)=3THEN460
420 IFPPOINT(CX,CY)<>PC THEN400E
LSE SX=CX:SY=CY:CX=X:CY=Y:CIRCLE
(X,Y),6,PC:PAINT(X,Y),PC,PC
430 CY=CY-20:CX=CX+20:IFCX=SX AN
D CY=SY THEN 460
440 PLAY SD$
450 PAINT(CX,CY),PC,3:GOTO430
460 POKE65314,248:CX=X:CY=Y:REM
check--(E)
470 CX=CX+20:IFCX=180THEN530
480 IF PPOINT(CX,CY)=3THEN530
490 IFPPOINT(CX,CY)<>PC THEN470E
LSE SX=CX:SY=CY:CX=X:CY=Y:CIRCLE
(X,Y),6,PC:PAINT(X,Y),PC,PC
500 CX=CX+20:IF CX=SX AND CY=SY
THEN 530
510 PLAY SD$
520 PAINT(CX,CY),PC,3:GOTO500
530 POKE65314,248:CX=X:CY=Y:REM
check--(SE)
540 CX=CX+20:CY=CY+20:IF CX=180O
RCY=180THEN600
550 IF PPOINT(CX,CY)=3THEN600
560 IFPPOINT(CX,CY)<>PC THEN540E
LSE SX=CX:SY=CY:CX=X:CY=Y:CIRCLE
(X,Y),6,PC:PAINT(X,Y),PC,PC
570 CX=CX+20:CY=CY+20:IF CX=SX A
ND CY=SY THEN 600
580 PLAY SD$
590 PAINT(CX,CY),PC,3:GOTO570
600 POKE65314,248:CX=X:CY=Y:REM
check--(S)
610 CY=CY+20:IF CY=180THEN670
620 IF PPOINT(CX,CY)=3THEN670
630 IF PPOINT(CX,CY)<>PC THEN610
ELSE SX=CX:SY=CY:CX=X:CY=Y:CIRCL
E(X,Y),6,PC:PAINT(X,Y),PC,PC
640 CY=CY+20:IF CY=SY THEN 670
650 PLAY SD$
660 PAINT(CX,CY),PC,3:GOTO640
670 POKE65314,248:CX=X:CY=Y:REM
check--(SW)
680 CY=CY+20:CX=CX-20:IF CY=180O
RCX=0THEN740
690 IF PPOINT(CX,CY)=3THEN740
700 IFPPOINT(CX,CY)<>PC THEN680
ELSE SX=CX:SY=CY:CX=X:CY=Y:CIRCL
E(X,Y),6,PC:PAINT(X,Y),PC,PC
710 CX=CX-20:CY=CY+20:IF CX=SX A
ND CY=SY THEN 740
720 PLAY SD$
730 PAINT(CX,CY),PC,3:GOTO710
740 POKE65314,248:CX=X:CY=Y:REM
check--(W)
750 CX=CX-20:IFCX=0THEN810
760 IFPPOINT(CX,CY)=3THEN810
770 IFPPOINT(CX,CY)<>PC THEN750
ELSE SX=CX:SY=CY:CX=X:CY=Y:CIRCL
E(X,Y),6,PC:PAINT(X,Y),PC,PC
780 CX=CX-20:IF CX=SX THEN810
790 PLAY SD$
800 PAINT(CX,CY),PC,3:GOTO780
810 POKE65314,248:CX=X:CY=Y:REM
check--(NW)
820 CX=CX-20:CY=CY-20:IFCX=0ORCY
=0THEN880
830 IFPPOINT(CX,CY)=3THEN880
840 IFPPOINT(CX,CY)<>PC THEN 820
ELSE SX=CX:SY=CY:CX=X:CY=Y:CIRCL
E(X,Y),6,PC:PAINT(X,Y),PC,PC
850 CX=CX-20:CY=CY-20:IF CX=SX A
ND CY=SY THEN880
860 PLAY SD$
870 PAINT(CX,CY),PC,3:GOTO850
```

```
880 PLAYSD$:IF PC=1THENPC=4:GOTO
160ELSEPC=1:GOTO160
890 REM CHECK NUMBER OF PIECES
900 BS=0:WS=0:FORW=20TO160STEP20
:FORV=20TO160STEP20:IFPPOINT(W,V
)=1THENBS=BS+1ELSEIFPPOINT(W,V)=
4THENWS=WS+1
910 NEXT:NEXT
920 BS$=STR$(BS):WS$=STR$(WS):BS
$=RIGHT$(BS$,LEN(BS$)-1):WS$=RIG
HT$(WS$,LEN(WS$)-1)
930 DRAW"C2":LINE(200,64)-(230,7
2),PSET,BF:LINE(200,104)-(230,11
2),PSET,BF:L=LEN(BS$):IFL=2THEND
RAW"BM212,65;C1;"ELSEDRAW"BM214,
65;C1;"
940 V1=VAL(LEFT$(BS$,1)):IF V1=0
 THEN GOSUB 1060 ELSE ON V1 GOSU
B 1070,1080,1090,1100,1110,1120,
1130,1140,1150
950 IF L=2 THEN V1=VAL(RIGHT$(BS
$,1)):IF V1=0 THEN GOSUB 1060 EL
SE ON V1 GOSUB 1070,1080,1090,11
00,1110,1120,1130,1140,1150
960 L=LEN(WS$):IF L=2THENDRAW"BM
212,105;C1;"ELSEDRAW"BM214,105;C
1;"
970 V1=VAL(LEFT$(WS$,1)):IF V1=0
 THEN GOSUB 1060 ELSEON V1 GOSUB
 1070,1080,1090,1100,1110,1120,1
130,1140,1150
980 IF L=2 THEN V1=VAL(RIGHT$(WS
$,1)):IF V1=0 THEN GOSUB 1060 EL
SE ON V1 GOSUB 1070,1080,1090,11
00,1110,1120,1130,1140,1150
990 RETURN
1000 REM end of game
1010 CLS:SOUND1,10:FORT=1TO5000:
NEXT
1020 PRINT@64," ******* F L I P
  I T ********":PRINT@128,"BLACK
 HAS";BS:PRINT@192,"WHITE HAS";W
S
1030 IF WS>BS THEN S$="WHITE"ELS
E IF WS<BS THEN S$="BLACK"
1040 IF WS=BS THEN PRINT@256,"
 IT'S A TIE GAME."ELSE PRINT@256
,"   ";S$;" IS THE WINNER."
1050 PRINT@320,"ANOTHER GAME";:I
NPUTI$:IFLEFT$(I$,1)="Y"THENRUNE
LSEIFLEFT$(I$,1)="N"THENENDELSE1
050
1060 DRAW"R4D6L4U6R4BR4":RETURN
1070 DRAW"D6BR4BU6":RETURN
1080 DRAW"R4D3L4D3R4BU6BR4":RETU
RN
1090 DRAW"R4D3NL4D3NL4BR4BU6":RE
TURN
1100 DRAW"D3R4U3ND6BR4":RETURN
1110 DRAW"NR4D3R4D3NL4BU6BR4":RE
TURN
1120 DRAW"NR4D6R4U3NL4BU3BR4":RE
TURN
1130 DRAW"R4ND6BR4":RETURN
1140 DRAW"R4D6L4U6D3R4U3BR4":RET
URN
1150 DRAW"R4D3L4NU3BD3R4U6BR4":R
ETURN
```

One-Liner Contest Winner . . .

Has anyone told you to go fly a kite lately? If so, key in this program and fly one indoors.

The listing:

```
54 PMODE3:SCREEN1,0:FORX=192TO60
STEP-2:PCLS:DRAW"BM"+STR$(X)+",1
60S16C2E2NF2ULNHRUEHGFDR2C3E12C3
BD3E3H3G3F5S8C4R4NFL4GD4FC3R4NEC
4NR4GD4FR4EU4NHD4C3R4NFL4GD4FR4N
EC4NR4GD4FR4EU4H":NEXT:FORR=1TO8
0STEP1:Y=82:K=RND(4):CIRCLE(120,
Y+R),85,K,1,.5,.99:NEXT:RUN
```

Edward R. Gehrke
Nassau, NY

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

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THE RAINBOW and the Delphi Information Utility have joined together to allow CoCo owners all over the world to connect with one another!

Delphi is a full-service information utility. It offers everything from up-to-the-minute news stories from The Associated Press to electronic mail services. But, *best of all*, it now has **a special forum for Color Computer owners, and it's operated by the people who bring you THE RAINBOW each month.**

The CoCo Special Interest Group (SIG) features a variety of services, including an open forum where you can send and receive messages from Color Computer owners all over the world. It also has several databases to which you can upload your favorite programs and from which you can download programs written by other CoCo enthusiasts. Some of these databases are BASIC programming, OS-9 and home applications.

When setting up your account with Delphi, if you do not have a credit card or prefer not to use it, Delphi requires that you send $25 to give your account a positive balance. This will be refunded after your first free hour if you choose to no longer use the system or it will be applied to future connect charges. If you do not maintain a positive balance, you will be charged $3.50 each month for direct billing.

PEEK INTO THE RAINBOW

The CoCo SIG's conference feature allows you to meet electronically with other members of the CoCo Community. You can join conferences with notables such as Dale Puckett, Cray Augsburg, Marty Goodman, Don Hutchison, Jim Reed, Lonnie Falk and others — on a regular basis. Conference schedules will appear in THE RAINBOW each month. Be sure to check online announcements for changes and additions.

THE OTHER SIDE OF THE RAINBOW

On Delphi, you also are able to buy RAINBOW ON TAPE — order a whole set, or download an individual program immediately. You can also renew your RAINBOW subscription, make a fast and easy order for software or hardware from a multitude of vendors, or inquire about products on the CoCo SIG.

We also have a number of **programs that you can download** and use, just for the cost of the time you spend transferring them. There'll also be **corrections for RAINBOW articles**, helpful hints and many other useful features.

FREE LIFETIME MEMBERSHIP

THE RAINBOW is offering subscribers a free lifetime subscription to Delphi — a $24.95 value — and a free hour of connect time — a $7.20 value at either 300, 1200 or 2400 Baud — so you can sample Delphi and the RAINBOW CoCo SIG. That's right. Your subscription to THE RAINBOW entitles you to this $32.15 value as a ***free bonus!***

If you're not a RAINBOW subscriber, just enter your order when you sign on with Delphi and you'll get the same great deal! For our $31 subscription fee, you'll get the finest Color Computer magazine ever, a free lifetime subscription to Delphi and a free hour of connect time.

SAVE EVEN MORE

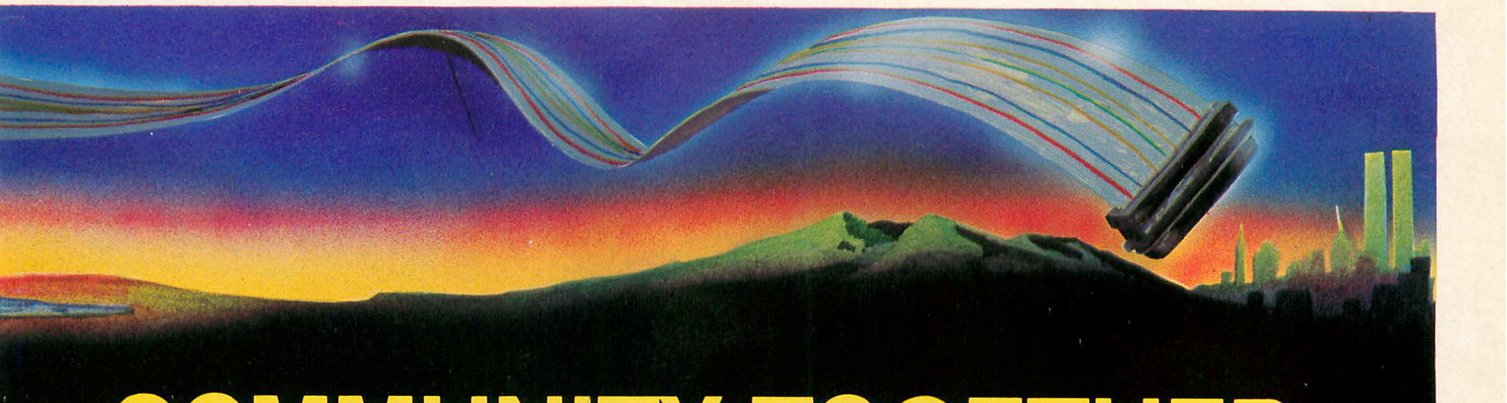
Want to save even more? While you're online you can order, for only $29.95, a deluxe package which includes the Delphi membership, the *Delphi Handbook and Command Card* ($21.95) and a total of three hours of connect time ($21.60).

Delphi provides us all with **Immediate CoCo Community**. Check it out today. After all, you can sample it for free!

Problems? Call Delphi:
(800) 544-4005
(617) 491-3393

DELPHI

TYPE:
GROUP COCO



COMMUNITY TOGETHER

How to reach RAINBOW's Color Computer SIG . . .

There are several ways to connect to Delphi and THE RAINBOW's CoCo SIG. In most cities you will not even have to pay long distance charges; you can use special data communications networks like Telenet, Tymnet and the Canadian Datapac network.

First, set your terminal program to operate at either 300 or 1200 Baud (depending on the modem you have), and also select either 7 bits with even parity or 8 bits with no parity, and one stop bit. (If one combination doesn't work, try another.)

Decide which network you should use. There is no surcharge for Telenet or Tymnet. Canadian residents using Datapac will be charged an additional $10.80 (U.S.) per hour.

On Telenet: Uninet network has merged with Telenet. To get the Telenet number for your area, call (800) 336-0437. After you call the local access number and make connection, press ENTER twice. When the "TERMINAL=" prompt appears, press ENTER again. When the "@" prompt appears, type `C DELPHI` and press ENTER.

On Tymnet: Call (800) 336-0149 to get the Tymnet number for your area. After you dial your designated number and connect, you will see either "garbage" or a message saying "please type your terminal identifier." At this point, even if the screen is garbled, simply press 'A'. When "please log in:" appears, type `DELPHI` and press ENTER.

From Canada (on Datapac): Call Delphi Customer Service at (617) 491-3393 to get the Datapac number for your area. After you connect, press the period key (.) and ENTER (use two periods if you're using 1200 Baud). Type `SET 2:1, 3:126` and press ENTER. Now type `p 1 3106, DELPHI;` and press ENTER. Delphi's new rates indicate an additional $10.80 hourly surcharge for evening use of Datapac, which means a total of $18 (U.S.) for connect time.

From other countries: Many countries have their own data networks that can connect to either Telenet or Tymnet. Check with the telephone authorities in your country for details on how to sign up for this service. When you have an account set up, you can reach Delphi with a "host code" of 3110 6170 3088 through Telenet, or 3106 90 6015 through Tymnet. (You'll have to pay the toll charges for this connection.)

Type in Your Username

If you're already a subscriber to THE RAINBOW, at the "USERNAME:" prompt, type `JOINDELPHI` and press ENTER. At the "PASSWORD:" prompt, type `RAINBOW`. Then, at the "NUMBER:" prompt, type your individual subscription number from the mailing label of your latest issue of THE RAINBOW. (If there are one or more zeros at the beginning of this number, include them.)

If you don't already have a subscription, at the "USERNAME:" prompt, type `JOINDELPHI` and press ENTER. At the "PASSWORD:" prompt, type `SENDRAINBOW` and press ENTER. Have your MasterCard, VISA or American Express card ready, because you'll be led through a series of questions that will enable us to put your RAINBOW and Delphi subscriptions into effect. In an effort to hold down non-editorial costs, we do not bill for subscriptions.

If you make a typing error, just use Control-X and start over. Remember that at any point, when you're on Delphi, you can type `HELP` to get help on how to use the system. To get off the system just type `BYE`.

If you find that you're unable to log on to Delphi and enter the CoCo SIG after following these instructions, call us during afternoon business hours at (502) 228-4492. We'll be glad to offer assistance.

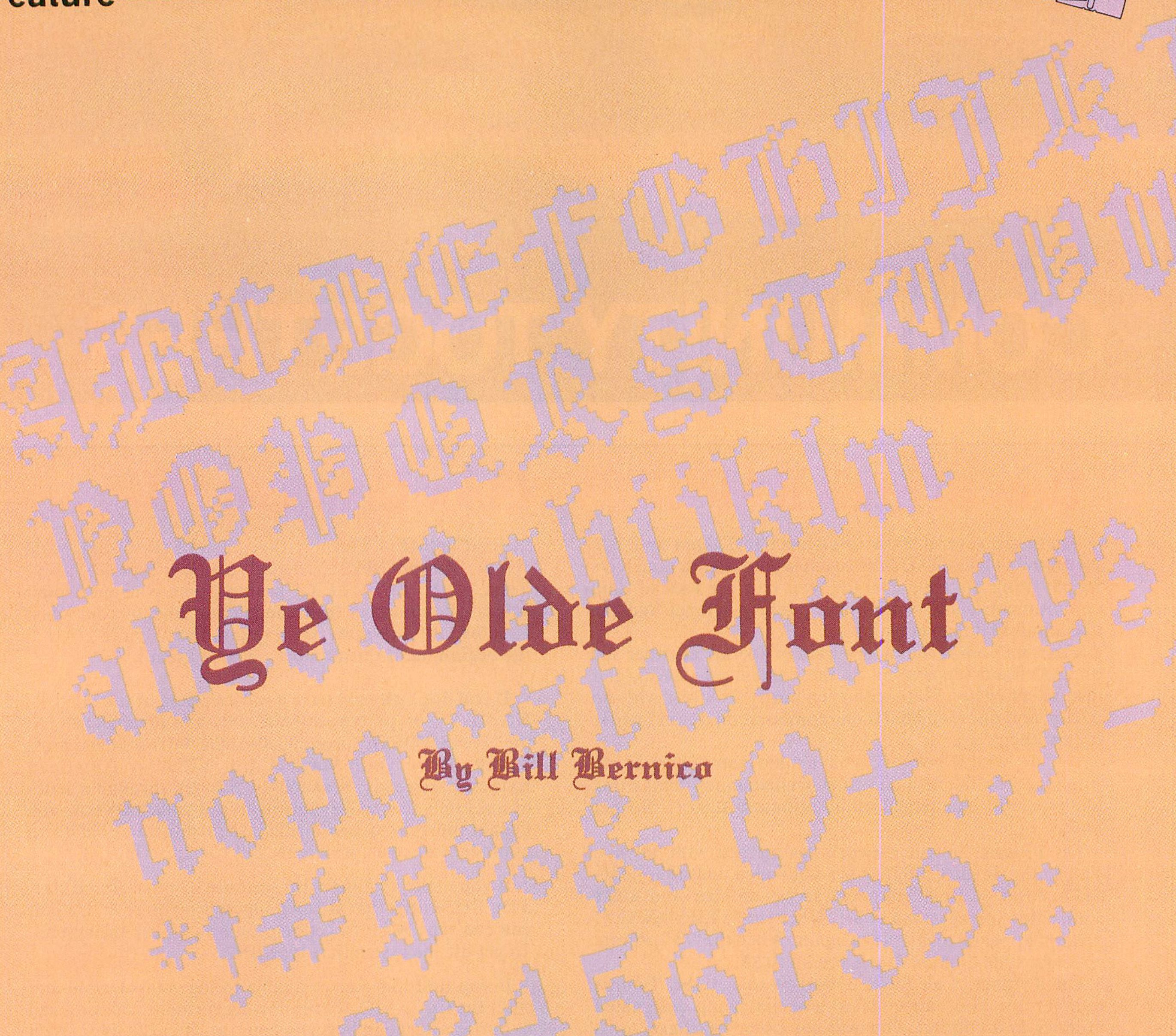
Come Visit Us! Type: `GROUP COCO`

After you sign in, you'll be prompted to set up your own, personal "user name" — Delphi is a friendly service, no numbers to remember — and you'll be asked a number of questions so Delphi can set up your account. You'll also be assigned a temporary password.

Delphi will tell you that your account will be ready after 6 p.m. the same day if you sign up before noon (Eastern time zone.) If not, your account will be ready at 6 p.m. the next day. Once an account is verified and opened, *each RAINBOW subscriber will be credited with an hour of free time!*

When you log back in, use your chosen username and your temporary password to access the system. At that point, you will meet Max, who will help you configure things and will change your temporary password into your own *personal* password. This is the password you will use for subsequent sessions — or until you change it.

After Max bids you goodbye, you'll wind up at the Delphi Main Menu; type in `GROUP COCO` and **join us on the CoCo SIG!**



Ye Olde Font

By Bill Bernico

I am sure most of you have worked with or at least have seen some of the print font styles used in the commercial graphics editors that are on the market today. Have you ever wished you could use just the font part of that program in your own BASIC program? Up until now you couldn't, with the exception of some standard fonts that have appeared in RAINBOW the past few years.

In the July '84 issue (Page 82), Peter Stumpf showed us how to put graphics characters on the screen to spell out messages. It works great, but in its present form it uses up a lot of variable names and requires quite a few lines to spell out even short messages. That's because you have to join many strings together in order to spell out words.

In the procedure presented here, all the characters are stored in `A$(32)` through `A$(122)` with the exception of 91-96, since they are seldom used. This procedure works for any of the many font styles since the character-string numbers are the same for each set. They will always be labeled 32-122 to match the ASCII number for that character.

In this sample `A$` contains the message you want to draw on the graphics screen. Lines 1020 through 1060 (the "core" of the program) do the actual drawing of the pre-defined string. Each time you want to spell out a message you have to do three things: Store your message in `A$`, define where that message will be drawn, and `GOSUB` to the drawing routine, in this case Line 1020.

You may delete my lines 890 through 1010. They are merely samples of how this print font will look on the screen. Substitute your own message using the three-step procedure.

I keep this particular program on a disk in my collection marked "Programming Aids and Tools." Whenever I need a shortcut to get me through a programming procedure, I simply reach for this disk. It also contains a dozen or more other font styles that I have converted to `DRAW` strings.

Anyone wanting copies of these programs can send me a 22-cent stamp for a paper listing. For disk or tape, send $1.39 in stamps.

(Questions or comments about this program may be directed to the author at 708 Michigan Ave., Sheboygan, WI 53081. Please enclose an SASE when writing for a response.) ☐

Bill Bernico is the author of over 200 Color Computer programs and is a frequent RAINBOW contributor whose hobbies include golf, writing music and programming. Bill is a drummer in a rock band and lives in Sheboygan, Wisconsin.

170	45	600	62
290	132	710	50
420	90	880	84
500	45	END	113

The listing: SCRNFONT

```
10 'ENGLISH PRINT FONT
20 'FROM KROMICO SOFTWARE
30 'BY BILL BERNICO
40 '
50 DIM A$(122)
60 PMODE4,1:PCLS1:SCREEN1,1:COLO
R0,1
70 A$(32)="BR8
80 A$(33)="BR2G2RED8BD2D2HR2HBU2
U3LU3R2D3U5FBU2BR2
90 A$(34)="BRBUGDRND2RULBR3DRND2
RULUBR3
100 A$(35)="BR7G2D6LDU6L2GR3D3L3
GR3ND2R4UNL2D3EU5NL3UL2NUR3UD5R2
EL3U3R3EL3U2EBR5
110 A$(36)="BR5DND15G4D4RNU4E3R3
D6LNU6DLDL3HL2NDE2GR2DR2U10RFURU
NL3EBUBR3
120 A$(37)="BR4LG3DED2ED2EDE3LEL
2EL2EBR6G2RDLD2HD3HD3HD3HD2UBR6R
EL3EL2ELE3DED2ED3EUBU7BR2
130 A$(38)="BR6RF2NG3L2UL2G2RGDE
DRND3G2NR3G3RGDERGDERGD2EURE3H2R
2D2F5REUGLNH4UH4E2R2D2RENL5BU8BR
3
140 A$(39)="BRD4UHR2UL2BUBR5
150 A$(40)="BR6G4REG3REG3R2UG2ND
5RD7RU4D5RU3FDBU16BR3
160 A$(41)="BD17E4LGE3LGE3LGUE2D
HENU3LNU5HNU5UHU3GDBU2BR7
170 A$(42)="BR3D3ND3NL3NR3NG2NH2
NF2E2BUBR3
180 A$(43)="BR5BD4D4ND4NL4LND5NU
3DL4R8UL3R4BU8BR3
190 A$(44)="BRBD13D3GE2UL2RBU14B
R5
200 A$(45)="BD9NR6ER6BU8BR3
210 A$(46)="BD15R2GU2BU14BR5
220 A$(47)="BD16E2LELE2DHE2DHE2D
HE2DHE2DHE2BR3
230 A$(48)="BR4G3D8UHU4E4NR2DNR3
FNR3FR2GR2D4LU4D6G3UNE3L2H2EDRDR
BU12BR8
240 A$(49)="BD2E2ND13GR2UD13H2R4
GE2BU11BR3
250 A$(50)="BD4E4L2D3HUR2ER2DRND
5FD3NG3LNG7LG5D3GUENR6FNR4FR2E2H
REBU10BR3
260 A$(51)="BR3G3NF2RE2RNG3DRF2D
HD2HD4H2ED2R2D4ENU2G4H3LE2D2ED2E
D2EBU13BR6
270 A$(52)="BR6D14FU14LG6DR8FL8R
6D3FDEBU13BR3
280 A$(53)="BR9G3L4U2R5GL4D6E3RG
2RERGR2FND3L3FRD3G3LHNR3HNR5HLR4
H2GRBU10BR10
290 A$(54)="BR5F2RGH2LF2DH2LG2D9
HNU6UE5D2EUD3EUND5FD3G5U3LU3BU11
BR9
300 A$(55)="BD3E2R7GNL7G2RG2RG2E
RG3ERG2ERG2D2FU3ED4E2LBU13BR6
310 A$(56)="BDBR6L3G3R2DL2FRED3H
R3HD2R3HD3HR3ND3GD3G2NH4L2UR2NH4
L3ULULUE8L2DEUL2UBR6
320 A$(57)="BUBR4G4D3FNU4EUD3RU2
FE4ND5GD6G2NL5G2HRU2L2EBU7BR4R2U
H2LF2LNH2LHU2BR7
330 A$(58)="BD7R2GU2BD6D2HR2BU13
BR4
340 A$(59)="BD7R2HD2BD4D3GE2UL2B
U13BR6
350 A$(61)="BD6R6EL6BD3R6GNL6BU9
BR5
360 A$(63)="BR3G3ER4HLD2R3DL2FRG
4DBD2D2HR2BU13BR6
370 A$(65)="BD6U3NE2RE3NR3DR4G3L
2DEUR3EG2DGDG2NH3NR7DNR7G2NR3DNR
4DFBR3HR2E3D3FNE2U14GND9E2BR3
380 A$(66)="BD3UEDRUR3EG3D4L2GDE
R2D5LG2NDE2REU9FED8EU8EDER3GR2D2
```

$ $ $ $ $ $ $ $ $ $ $ $ $ $

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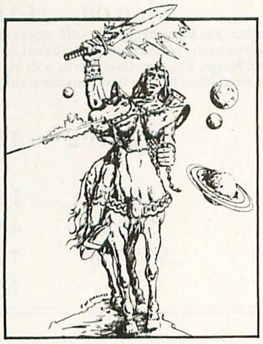
$ $ $ $ $ $ $ $ $ $ $ $ $ $

```
HD2G2HUND9D2R3ND5FD4LG2L5GE3R3DL
3BU13BR8
390 A$(67)="BDBR4G3RG2ND4RD6FNU4
RNU2ED2NR4UR6NE2NUL3U12G3D6EU6ER
5GLU2LUBR6
400 A$(68)="BDBR2NR7FR8GR2GRD2NL
2D3NL2D3GNL6GL6GE3U10G3D7G2E3U2L
3GE2R2U4E2R2D5RGD2RGDBU11BR7
410 A$(69)="BR4G3ND8RG2D4RED4RNU
2FNU2NR4ER5NE2NUL3U12G3D6EU6ENR7
ER2D2R3G4R4UNL3BU5BR3
420 A$(70)="BD6E2DR3UL2EU2D14L2G
R2ERURUHU11R7NUL2UL3ED13GU8R3EL4
U4BUBR8
430 A$(71)="BD6D4FDU8E3D9G2U2D3N
R7ERD2R4HU12L2ND8R5HD2R2GR2G4R4H
LD2R2ND3LD3G2BU13BR6
440 A$(72)="BD3UNR5ER5EG4D9GRENU
9FRNU11EU11E2NRG2D4RE3D2END9RD7G
2LEBU13BR5
450 A$(73)="BD3URUR2D12L2GDR2UEU
11EBR3G2D12L2DRE2U12EBR3
460 A$(74)="BD5BRRUL2U2E2R3DL4R6
DL3R5LG3D9GL3G2ER3DRUR3U2RU10ED9
BL3DU9E2RERBUBR3
470 A$(75)="BD3E2R3NEGL2FD8G2LGE
5DU8BR2NE2D8G3R4HLD2FURE3D2FU2FR
DH4LF2EH2E3LEL3GE2RBU3BR6
480 A$(76)="BD2E2R4EG2NL4D11L2G2
ERENU9RNE3R2F2RNE3HRNE2UE2LHBL3N
U7FU7EBU3BR7
490 A$(77)="BR6LG4D11LUREU5L2UR2
U4ERD11NG2U5R6D5EG3H2R3GNU12HU6L
NR5RU5LHR2DR6H2GRGND5R2DR2D12NEH
U11E2BUBR3
500 A$(78)="BD3E2D2R3H2D14L3NDER
2EU10RED11NG2U4E3R4GDGDGDR4EG2
L2U2RHEUEUEU3L3FRU2L3G3E4RL5E2RG
R2BUBR7
510 A$(79)="BR9L4G5ND6RD8R8LGL4U
2LUE2NU8LU7ER6FL3HGD10UE3R3DG3RE
U5FUL3NG2RE2DHULBU3BR6
520 A$(80)="BUBD3E3D2LR2HD2LR2ND
14GND13DG3R2GRDFGLNG2DR2D4R3U3NU
13R4GU2L3R5EL2E2DNU7HU2L2G3FRLHE
3REUL3NGR2EU2GU2GL2E2NDBR8
530 A$(81)="BR8L3G5ND6RD8R10GR2E
GHL3GL4UHUF2R2NU13R2E4G2DEU9L3HR
3D2LFNG3DERD4L3G3UBL3NU8EU8EBR11
540 A$(82)="BD14E5U8EG2L2GE2RD10
G2E3FG2R5G2HRU2LUENU8ENE4F4DNE3H
2R3H3LNF3UE2U4L4E2D3FR2UL2U2BUBR
8
550 A$(83)="BR11G6H3UE2R3D2REL6G
F3NR6L2HG2DED2ED2NR7ENR5RE2L2R8G
R2ND3GD3G3UGU4RNDG5L3HU2R7DH2RL5
R2UBU10BR13
560 A$(84)="BD3E2DE2NR5DR9EG2L5D
6G3NU3LU7NE3RG2D3F2E2NU5G2NR2DR8
NE2NULGNL4U12BUBR7
570 A$(85)="BD3E2R6EG2L6R4G4ND4R
NED6FU3FD2FU2FR3NE4GNL2U13G2D6GU
5EBR4E3D13E2L3DU11FRBU3BR4
580 A$(86)="BD3UE2RG2RD10NLENU11
D2F2NE6H2R3GUHRUNE3U3NE3U6H2BR7N
G3D9ENL3U3NL3U3NL2UHBR4
590 A$(87)="BD3E3D14H2RU9LE2RFD1
2GU3FRE2U10GE2D14HUF2DU3RD2NE4U1
3BR2UED11EU9HBR4
600 A$(88)="BD3E3D4FU4LGR2D6L3ER
3U4D6GDG2ND2L3NDERFRBR4R4EG3REL2
U2LND2LU5R3GL3D3R2UL2U5EUE2LED3F
U3FDEBU2BR4
610 A$(89)="R3GRD10NG3LG2D2ED2NR
3ER4HR5DGBU3L2BU2RL4U10FRUD9UE3R
3D2G2LEURU4L3NGR4DU3GU2GU2GUL2BR
8
620 A$(90)="BD3UE2D2LR8U2GNL7D2N
G5LG3L3R8L2GLDR3L8R4G2RERG3UGD2G
UR8GU2R2L7RER5EBU11BR3
630 A$(97)="BD6NE3F2G2D2F2U3HD2R
FUR3D2EL2NU9EU8NEL3F2DGNLEU3HBU3
BR6
640 A$(98)="RD12NLFNU13FU2FURENU
7RU6L2U2G3U6EBR7
650 A$(99)="BD6NE3RD5GR5EG2LGU3L
RU6E2D2ED2EBU5BR3
660 A$(100)="BFGDERGR2GR2G4ND4RD
5FU3FD3E3NU6LNGU5NE2ULURBU5BR5
670 A$(101)="BD7RNE3D4GRFNU6F2NE
3UEL2ELU2E4L3FU2LBU5BR6
680 A$(102)="BR3G2D12LR3GU9L2R4L
2U4EDED2EBU2BR3
690 A$(103)="BD17R5EL5E6D5L2EU2L
2GLEL2NU5EU4E3D2ED5EU4EBU4BR3
700 A$(104)="BDFD13E2NL3HU10NE2D
6E4GDED9G3ERE2U9BU5BR3
710 A$(105)="BD6ED9FE2LGU9RHBU2U
RBUBR4
720 A$(106)="BD5ED2ED10GE2U8H2BU
2URBUBR4
730 A$(107)="BDFD12HR4G2U13NE2D6
E3R2FL3FRG4ER2GR2D4EUL2U3BU10BR5
740 A$(108)="BDFD11NL2DFELU13EBR
3
750 A$(109)="BD6UED10HF2ELU9FNRE
2D10FU10FNRE2D10RNE2U9FBU6BR3
760 A$(110)="BD5NE2RED9FE2LGU9FN
E2RED2RU2D9FE2LGU8EBU4BR4
770 A$(111)="BD7NE4ND4RD5F2UHUF2
E2NU6LU4H2EDFU2BU4BR4
780 A$(112)="BD5E2D13LR2NFU5NL2U
7FE2D2ED9GH3R5DL3FE2U6BU5BR3
790 A$(113)="BD6NE3ND6RNE2D7FU2F
E2D5NGR2HU9FG2DU5L2EBU4BR6
800 A$(114)="BD5NE2RED8HF3E2LGU2
```

```
GU8FE2D2ED3EUBU5BR3
810 A$(115)="BD13NE8R6GLU2NL3BR3
ENU2LU3LD2HL3EL2NU2EU2E2DR4GNL2E
2BU3BR3
820 A$(116)="BD4NE3RD9HR2D2EDNE2
HU10FRBU4BR4
830 A$(117)="BD5NE2RED8FNU9FU3FD
EF2E2L3FU10G2R3G2D5U8BU4BR6
840 A$(118)="BR3G3RDEUD10NLF2NE4
U2RL2ELU7BR4NHD7EU5BU5BR3
850 A$(119)="BR2G2D2RU3D12HF2EUG
U9FE2ND9FD8F2E2RGNHEU9NG3FND8BU4
BR3
860 A$(120)="BD6E3DGRD2RU2D5G4U3
FRE2RD2RD2E3GLHUHUE4D2HLE2BU3BR3
870 A$(121)="BD5NE2RED10GDFR3EUG
BH3RNU10EDE4NU6LU5G2BU6BR6
880 A$(122)="BD7UE3D2ED2EDG4R4HL
D2R3DL2D2EL2DL2GDFR2EBU16BR5
890 A$="English Print Font":DRAW
"BM5,5":GOSUB 1020
900 DRAW"BM0,33R255
910 A$="ABCDEFGHIJKLM":DRAW"BM0,
50":GOSUB 1020
920 A$="NOPQRSTUVWXYZ":DRAW"BM0,
70":GOSUB 1020
930 A$="abcdefghijklm":DRAW"BM0,
90":GOSUB 1020
940 A$="nopqrstuvwxyz":DRAW"BM0,
110":GOSUB 1020
950 A$="*!#$%&'()+.,/-?=":DRAW"B
M0,130":GOSUB 1020
960 A$="0123456789:;":DRAW"BM0,1
50":GOSUB1020
970 FORX=1TO1500:NEXT
980 PCLS1:A$="brought to you":DR
AW"BM50,30":GOSUB1020
990 A$="by Bill Bernico":DRAW"BM
45,55":GOSUB1020
1000 A$="& Rainbow Magazine":DRA
W"BM20,80":GOSUB1020
1010 FORX=1TO1000:NEXT:PCLS1:GOT
O880
1020 FOR X=1 TO LEN(A$)
1030 Y=ASC(MID$(A$,X,1))
1040 IF Y<0 THEN Y=0
1050 DRAW A$(Y)
1060 NEXT:RETURN
```

SUNDOG SYSTEMS



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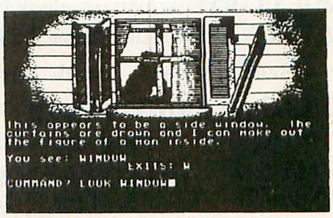

This appears to be a side window. The curtains are drawn and I can make out the figure of a man inside.
You see: WINDOW
EXITS: W
COMMAND? LOOK WINDOW

WHITE FIRE OF ETERNITY

64K Animated Graphic Adventure. See 12/86 Rainbow review. Only $19.95.

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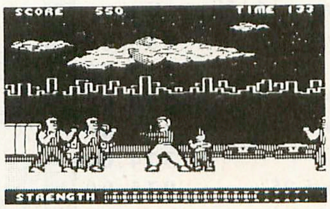
"The CoCo karate gap has been filled and Kung-Fu Dude does it excellently. I highly recommend (it)!" -2/88 Rainbow review

"A definite 5 stars!" -12/87 Wizard's Castle review



CHAMPION

64K Superhero Action Adventure. See 5/87 Rainbow review. Only $19.95.

All programs CoCo 1, 2, 3 compatible unless stated otherwise.

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B&B XT ROM (Auto Boot OS9)	**19.95**

(See software listed under B&B to right)

Hard Drive Controllers

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Disadvantage; requires a multi-pak.

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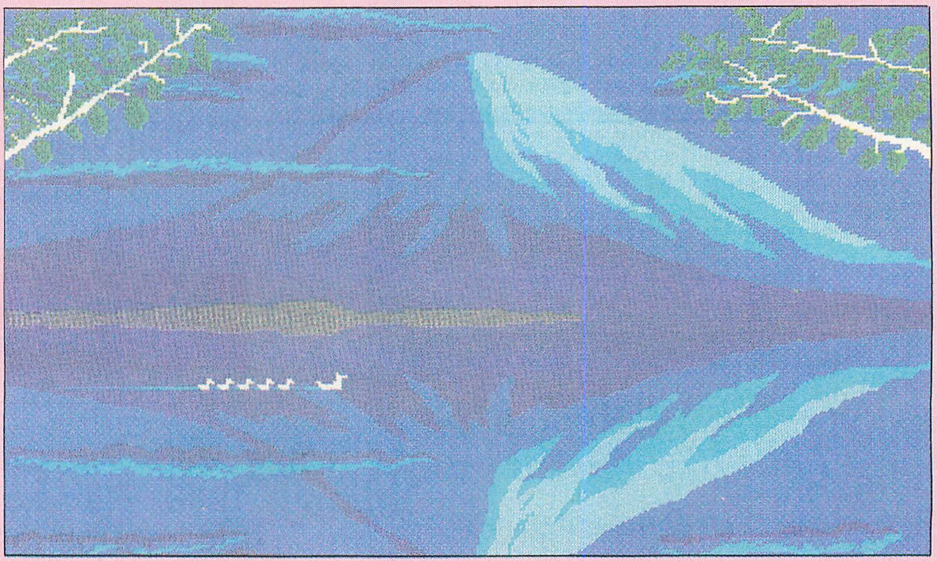
Dumping CoCo 3 graphics screens to the CGP-220

CoCo 3 Color Dump

By Duane M. Perkins

Viewed on an RGB monitor, the 16-color graphics from a CoCo 3 are truly impressive. Wouldn't it be nice if they could be printed in hard-copy form? Well, here are the programs you will need to dump those screens to a CGP-220 Color Ink Jet Printer.

You will need a machine language subroutine to generate output to the printer. Listing 1 is the printout from *EDTASM*. This code is included in the BASIC program in Listing 5. The parameter passed from BASIC is a pointer to a string descriptor. The string contains Hex codes for each of 16 permutations that are used to select the color of the pixels. Each pixel consists of a 2-by-2 array of four dots. Two diagonally opposite dots are printed with the color code from one of the Hex digits, and the other two dots are printed with the color code of the other Hex digit. Each Hex digit of the Hi-Res screen memory contains the palette slot number used to select the color for the dot on the screen that corresponds positionally to the Hex code in screen memory. When the screen is printed, each Hex digit is similarly used to select one of the 16 bytes in the color code string.



The subroutine does not print directly from the Hi-Res screen memory. The data must be moved to the upper 64K block, starting at `$4000`. After printing 15K, the subroutine returns to BASIC. Another 15K segment can then be printed. Two segments are required to print a full 16-color Hi-Res screen. This approach allows the flexibility of printing data from any source, not necessarily the Hi-Res screen memory. The BASIC program in Listing 2 generates the data to print color patches corresponding to each of the 64 permutations (see Figure 1). The ML code is in lines 410 through 430. The pokes in Line 70 modify the ML so that only 10 lines are printed on each call. After printing the patches, you can use the color chart to select codes for the color code string in Listing 5.

Listing 3 is a BASIC program to save a Hi-Res screen to four disk files; the first three are 8K and the last is 6K. The extension identifies the files sequentially from 0 to 3. Listing 4 is a BASIC program to load the four files and display the screen. Listing 5 is a program that will load and print the four files. The ML code is in lines 200 through 220.

You can use the program in Listing 6 to create pie charts. Set `N` (Line 10) to the number of slices and code `DATA` statements (replace lines 380 through 510) with the size, color and label of each slice. The size must be expressed as a fraction of the pie and the sum of

---

Duane M. Perkins retired as director of management information systems at the Panama Canal. His interests include electronics and computers, and he has had a number of articles published in Modern Electronics.

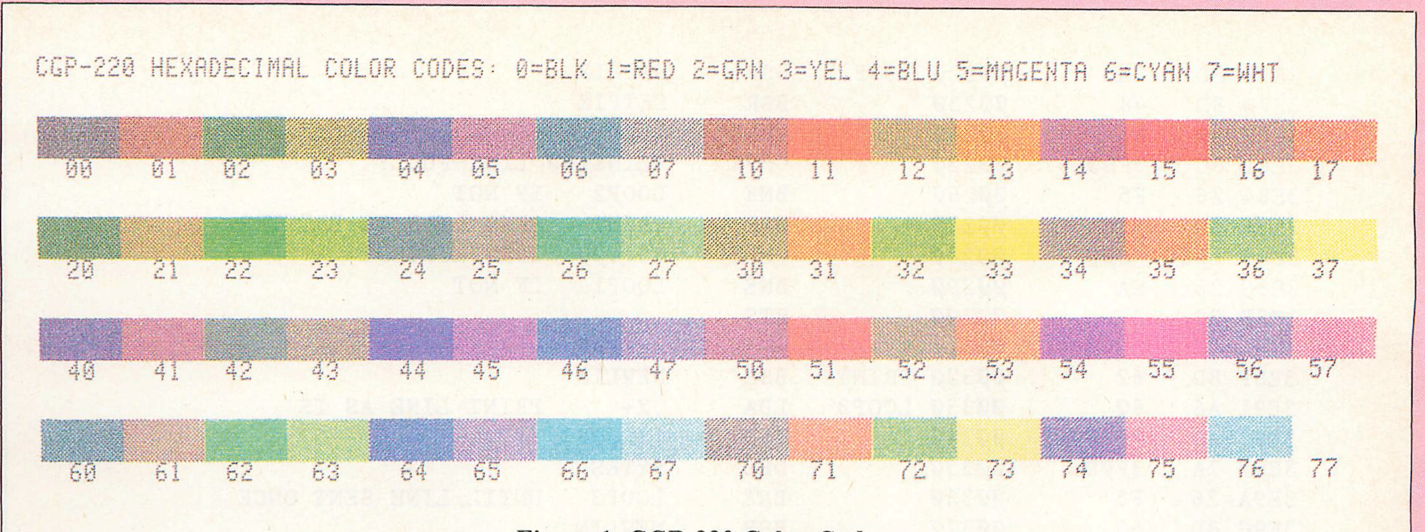


Figure 1: CGP-220 Color Codes

these should be unity. The color code must range from 0 to 15. The label may be up to eight characters in length. As shown in Figure 2, the colors of the slices are selected from palette slots 2 to 15; each is one-fourteenth of the pie. The background and foreground colors are selected from slots 0 and 1. When the chart is printed, the colors will be selected from the bytes in the color code string that correspond to the respective palette slots.

To use these programs, you must first create a screen using `HSCREEN 2`. Run the program in Listing 3 to save the screen. You can try different colors by using the `PALETTE` command and running the program in Listing 4. When you are satisfied, run the program in Listing 6 with the palette set up as it was for the screen to be printed. The screen will show a color wheel with the colors labeled in accordance with the palette slot numbers. Select a set of Hex codes from the printout of Listing 2 that you want to substitute for the colors on the screen. You can select the nearest match for each corresponding palette slot color or substitute any color you choose. Change Line 80 of Listing 5 accordingly and run the program. Keep in mind that the first two characters are the codes for the background and foreground, respectively.

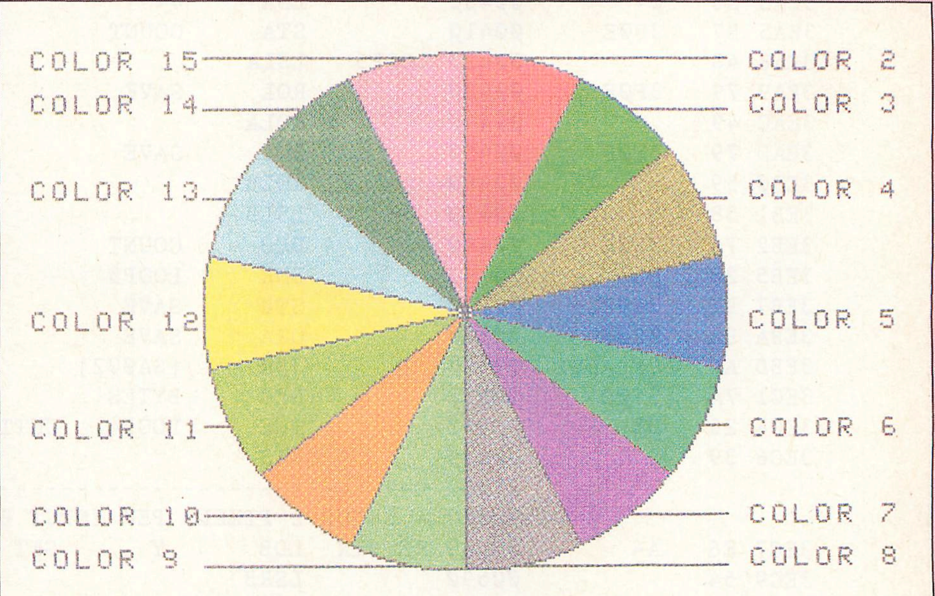


Figure 2: Sixteen-Color Pie Chart

(Questions or comments regarding these programs my be directed to the author at P. O. Box 255, Mt. Gretna, PA 17064. Please enclose an SASE when requesting a reply.) ☐

Listing 1:

```
                        00100           TITLE   LISTING 1
                        00110 * PRINT 4-DOT PIXELS
                        00120 *-------------------------------------------------
3E69                    00130           ORG     $3E69
3E69 BD    B3ED         00140 ENTER     JSR     $B3ED
3E6C 1F    01           00150           TFR     D,X
3E6E EE    02           00160           LDU     2,X     POINT TO COLOR CODE STRING
3E70 108E 4000          00170           LDY     #$4000  INPUT DATA
3E74 86    FE           00180           LDA     #-2
3E76 97    6F           00190           STA     $6F     OUTPUT TO PRINTER
                        00200 *-------------------------------------------------
3E78 8E    3F10         00210 LOOP1     LDX     #LINE
```

```
3E7B 8D    4A        00220 LOOP2   BSR       SETPIX
3E7D 8D    48        00230         BSR       SETPIX
3E7F 30    01        00240         LEAX      1,X
3E81 8C    3F60      00250         CMPX      #LINE+80 LINE FULL?
3E84 26    F5        00260         BNE       LOOP2    IF NOT
3E86 8D    07        00270         BSR       PRINT    SEND LINE TO PRINTER
3E88 108C  7C00      00280         CMPY      #$7C00   15K PRINTED?
3E8C 26    EA        00290         BNE       LOOP1    IF NOT
3E8E 39              00300         RTS
                     00310 *-----------------------------------------------
3E8F 8D    62        00320 PRINT   BSR       NEWLIN
3E91 A6    80        00330 LOOP3   LDA       ,X+      PRINT LINE AS IS
3E93 AD    9F A002   00340         JSR       [$A002]
3E97 7A    3F0D      00350         DEC       BYTES
3E9A 26    F5        00360         BNE       LOOP3    UNTIL LINE SENT ONCE
3E9C 8D    55        00370         BSR       NEWLIN
3E9E A6    80        00380 LOOP4   LDA       ,X+      TRANSPOSE ADJACENT BITS
3EA0 B7    3F0F      00390         STA       SAVE
3EA3 86    04        00400         LDA       #4
3EA5 B7    3F0E      00410         STA       COUNT
3EA8 48              00420 LOOP5   LSLA
3EA9 79    3F0F      00430         ROL       SAVE
3EAC 49              00440         ROLA
3EAD 79    3F0F      00450         ROL       SAVE
3EB0 59              00460         ROLB
3EB1 58              00470         LSLB
3EB2 7A    3F0E      00480         DEC       COUNT
3EB5 26    F1        00490         BNE       LOOP5
3EB7 F7    3F0F      00500         STB       SAVE
3EBA BA    3F0F      00510         ORA       SAVE
3EBD AD    9F A002   00520         JSR       [$A002]
3EC1 7A    3F0D      00530         DEC       BYTES
3EC4 26    D8        00540         BNE       LOOP4    UNTIL LINE SENT TWICE
3EC6 39              00550         RTS
                     00560 *-----------------------------------------------
                     00570 * SETUP 2 PIXELS PER INPUT BYTE
3EC7 E6    A4        00580 SETPIX  LDB       ,Y       GET LEFT HEX
3EC9 54              00590         LSRB
3ECA 54              00600         LSRB
3ECB 54              00610         LSRB
3ECC 54              00620         LSRB
3ECD 8D    07        00630         BSR       SETRGB   EVEN NUMBER PIXEL
3ECF E6    A0        00640         LDB       ,Y+      GET RIGHT HEX
3ED1 C4    0F        00650         ANDB      #$0F
3ED3 8D    01        00660         BSR       SETRGB   ODD NUMBER PIXEL
3ED5 39              00670         RTS
                     00680 *-----------------------------------------------
                     00690 * SET RED, GRN & BLU BITS FOR ONE PIXEL
3ED6 A6    C5        00700 SETRGB  LDA       B,U      COLOR CODES
3ED8 48              00710         LSLA
3ED9 48              00720         LSLA
3EDA 69    89 00A0   00730         ROL       160,X    LEFT BLU
3EDE 48              00740         LSLA
3EDF 69    88 50     00750         ROL       80,X     LEFT GRN
3EE2 48              00760         LSLA
3EE3 69    84        00770         ROL       ,X       LEFT RED
3EE5 48              00780         LSLA
3EE6 48              00790         LSLA
3EE7 69    89 00A0   00800         ROL       160,X    RIGHT BLU
```

```
3EEB 48           00810         LSLA
3EEC 69   88 50   00820         ROL     80,X     RIGHT GRN
3EEF 48           00830         LSLA
3EF0 69   84      00840         ROL     ,X       RIGHT RED
3EF2 39           00850         RTS
                  00860 *---------------------------------------------
3EF3 C6   03      00870 NEWLIN  LDB     #3       START A NEW OUTPUT LINE
3EF5 8E   3F0A    00880         LDX     #MODE
3EF8 A6   80      00890 LOOP6   LDA     ,X+
3EFA AD   9F A002 00900         JSR     [$A002]
3EFE 5A           00910         DECB
3EFF 26   F7      00920         BNE     LOOP6
3F01 86   F0      00930         LDA     #240
3F03 B7   3F0D    00940         STA     BYTES
3F06 8E   3F10    00950         LDX     #LINE
3F09 39           00960         RTS
                  00970 *---------------------------------------------
3F0A      1B43    00980 MODE    FDB     $1B43    COLOR SCAN MODE
3F0C      50      00990         FCB     80       ROWS PER LINE
3F0D              01000 BYTES   RMB     1
3F0E              01010 COUNT   RMB     1
3F0F              01020 SAVE    RMB     1
3F10              01030 LINE    RMB     240
                  01040 *---------------------------------------------
          3E69    01050         END     ENTER

00000 TOTAL ERRORS
```

Listing 2: COLORS

```
10 CLEAR 200,&H3E68
20 PRINT"PLEASE WAIT"
30 POKE &H96,&H12:'2400 BAUD
40 FOR A=&H3E69 TO &H3F0C
50 READ H$:POKE A,VAL("&H"+H$)
60 NEXT A
70 POKE &H3E8A,&H46:POKE &H3E8B,
&H40
80 DEF USR0=&H3E69
90 FOR A=16384 TO 17824 STEP 160
100 FOR C=0 TO 15
110 FOR B=0 TO 9
120 POKE A+B+10*C,16*C+C
130 NEXT B:NEXT C:NEXT A
140 PRINT#-2,"CGP-220 HEXADECIMA
L COLOR CODES: 0=BLK 1=RED 2=GRN
 3=YEL 4=BLU 5=MAGENTA 6=CYAN 7=
WHT"
150 C$="":FOR C=0 TO 7
160 C$=C$+CHR$(C):NEXT C
170 FOR C=&H10 TO &H17
180 C$=C$+CHR$(C):NEXT C
190 X=USR0(VARPTR(C$))
200 PRINT#-2,"   00      01     02
 03     04     05     06     07     10
    11     12     13     14     15
16    17"
```

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LYRA LYBRARY Supplement 1	(More LYRA music)	~~$29.95~~	$19.95
LYRA LYBRARY Supplement 2	(Even More)	~~$29.95~~	$19.95
LYRA LYBRARY Supplement 3	(Still more)	~~$29.95~~	$19.95
LYRA LYBRARY Supplement 4	(Even Still more)	~~$29.95~~	$19.95

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TRIPLE Y-Cable	(Connect 3 hardware paks together)	~~$34.95~~	$24.95
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512K TURBO RAM	(Complete memory upgrade with extras)	~~$119.95~~	$89.95
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See December 87 Rainbow pages 40,41,42,43,44,45 For Detailed Product Information

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Rainbowfest Sale

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EARS is trained by your voice and capable of recognizing any word or phrase. Training EARS to your particular voice print takes seconds. Up to 64 voice prints may be loaded into memory. You may then save on tape or disk as many as you like so that your total vocabulary is virtually infinite.

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Hands Off Programming. Imagine writing your own BASIC programs without ever touching the keyboard. Everything that you would normally do through a keyboard can now be done by just speaking.

Programming EARS Is Easy. LISTEN, MATCH and other commands have been added to BASIC so that programming EARS is a piece of cake! The single BASIC line: 10 LISTEN: MATCH will instruct EARS to listen to you and return the matching phrase.

It Talks. EARS is also capable of high quality speech. We mean REALLY high quality. The speech is a fixed vocabulary spoken by a professional announcer. Speech Systems is currently creating a library of thousands of high quality words and phrases. For a demonstration call **(312) 879-6844**, you won't believe your ears or our EARS.

DISK OWNERS. EARS will work with any disk system with either a MULTI-PAK or Y-CABLE. Our new Triple Y-CABLE was specifically developed for those wishing to add SUPER VOICE as a third device.

You Get Everything You Need. You get everything you need including a specially designed professional headset style noise cancelling microphone. The manual is easy to use and understand. Several demonstration examples are included so you don't have to write your own programs unless you want to. EARS will work in any 32K or 64K Color Computer.

SUPER VOICE $20 OFF

Imagine talking to your computer and it talking back to you. When you need an unlimited vocabulary, you can't beat SUPER VOICE. For a limited time, we will give you the SUPER VOICE for $59.95 with your EARS purchase. Even if you already have another speech unit, here is your chance to buy the best and save $20.

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Applications for EARS are astounding. Here is our first of many listening programs to come. VOICE CONTROL is a program specifically designed to allow you to control any appliance in your house with your voice and our HOME COMMANDER (sold separately) or the Radio Shack Plug 'N' Power controller. For example, you can control your TV by saying "TV ON" or "TV OFF". . **$24.95**

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```
210 C$="":FOR C=&H20 TO &H27
220 C$=C$+CHR$(C):NEXT C
230 FOR C=&H30 TO &H37
240 C$=C$+CHR$(C):NEXT C
250 X=USR0(VARPTR(C$))
260 PRINT#-2,"  20     21    22
 23     24    25     26     27     30
   31     32    33    34     35
36   37"
270 C$="":FOR C=&H40 TO &H47
280 C$=C$+CHR$(C):NEXT C
290 FOR C=&H50 TO &H57
300 C$=C$+CHR$(C):NEXT C
310 X=USR0(VARPTR(C$))
320 PRINT#-2,"  40     41    42
 43     44    45     46     47     50
   51     52    53    54     55
56   57"
330 C$="":FOR C=&H60 TO &H67
340 C$=C$+CHR$(C):NEXT C
350 FOR C=&H70 TO &H77
360 C$=C$+CHR$(C):NEXT C
370 X=USR0(VARPTR(C$))
380 PRINT#-2,"  60     61    62
 63     64    65     66     67     70
   71     72    73    74     75
76   77"
390 POKE &H6F,0:PRINT"DONE"
400 END
410 DATA BD,B3,ED,1F,01,EE,02,10
,8E,40,00,86,FE,97,6F,8E,3F,10,8
D,4A,8D,48,30,01,8C,3F,60,26,F5,
8D,07,10,8C,7C,00,26,EA,39,8D,62
,A6,80,AD,9F,A0,02,7A,3F,0D,26,F
5,8D,55,A6,80,B7,3F,0F,86,04,B7,
3F,0E,48,79,3F,0F,49,79,3F,0F,59
,58,7A,3F,0E,26,F1,F7,3F
420 DATA 0F,BA,3F,0F,AD,9F,A0,02
,7A,3F,0D,26,D8,39,E6,A4,54,54,5
4,54,8D,07,E6,A0,C4,0F,8D,01,39,
A6,C5,48,48,69,89,00,A0,48,69,88
,50,48,69,84,48,48,69,89,00,A0,4
8,69,88,50,48,69,84,39,C6,03,8E,
3F,0A,A6,80,AD,9F,A0,02,5A,26,F7
,86,F0,B7,3F,0D,8E,3F,10
430 DATA 39,1B,43,50
```

Listing 3: HRSAVE

```
"
10 F$="HRESFILE"
20 FOR N=&H30 TO &H32
30 POKE &HFFA2,N
40 SAVEM F$+"/HR"+CHR$(N),&H4000
,&H5FFF,&H4000
50 NEXT N
60 POKE &HFFA2,&H33
70 SAVEM F$+"/HR3",&H4000,&H57FF
,&H4000
80 POKE &HFFA2,&H3A
```

Listing 4: HRLOAD

```
10 F$="HRESFILE"
20 HSCREEN 2
30 FOR N=&H30 TO &H32
40 POKE &HFFA2,N
50 LOADM F$+"/HR"+CHR$(N)
60 NEXT N
70 POKE &HFFA2,&H33
80 LOADM F$+"/HR3"
90 POKE &HFFA2,&H3A
100 GOTO 100
```

Listing 5: CGPPRINT

```
10 CLEAR 200,&H3E68
20 POKE &H96,&H12:'2400 BAUD
30 FOR A=&H3E69 TO &H3F0C
40 READ H$:POKE A,VAL("&H"+H$)
50 NEXT A
60 DEF USR0=&H3E69
70 F$="HRESFILE"
80 C$=CHR$(&H77)+CHR$(&H00)+CHR$
(&H15)+CHR$(&H22)+CHR$(&H30)+CHR
$(&H46)+CHR$(&H26)+CHR$(&H54)+CH
R$(&H07)+CHR$(&H27)+CHR$(&H13)+C
HR$(&H23)+CHR$(&H33)+CHR$(&H76)+
CHR$(&H02)+CHR$(&H57)
90 LOADM F$+"/HR0"
100 LOADM F$+"/HR1",&H2000
110 X=USR0(VARPTR(C$))
120 FOR A=&H4000 TO &H43FF
130 POKE A,PEEK(A+&H3C00)
140 NEXT A
150 LOADM F$+"/HR2",&H400
160 LOADM F$+"/HR3",&H2400
170 X=USR0(VARPTR(C$))
180 POKE &H6F,0:PRINT"DONE"
190 END
200 DATA BD,B3,ED,1F,01,EE,02,10
,8E,40,00,86,FE,97,6F,8E,3F,10,8
D,4A,8D,48,30,01,8C,3F,60,26,F5,
8D,07,10,8C,7C,00,26,EA,39,8D,62
,A6,80,AD,9F,A0,02,7A,3F,0D,26,F
5,8D,55,A6,80,B7,3F,0F,86,04,B7,
3F,0E,48,79,3F,0F,49,79,3F,0F,59
,58,7A,3F,0E,26,F1,F7,3F
210 DATA 0F,BA,3F,0F,AD,9F,A0,02
,7A,3F,0D,26,D8,39,E6,A4,54,54,5
4,54,8D,07,E6,A0,C4,0F,8D,01,39,
A6,C5,48,48,69,89,00,A0,48,69,88
,50,48,69,84,48,48,69,89,00,A0,4
8,69,88,50,48,69,84,39,C6,03,8E,
3F,0A,A6,80,AD,9F,A0,02,5A,26,F7
,86,F0,B7,3F,0D,8E,3F,10
220 DATA 39,1B,43,50
```

Listing 6: COLORPIE

```
10 N=14
```

```
20 DIM F(N),C(N),S$(N)
30 FOR I=1 TO N
40 READ F(I),C(I),S$(I)
50 NEXT I:Z=96:HSCREEN 2
60 FOR X=0 TO 96
70 Y=INT(SQR(9216-X*X)+.5)
80 IF Y=Z OR Y=Z+1 THEN 140
90 HSET(160-X,96-Z)
100 HSET(160+X,96-Z)
110 HSET(160-X,96+Z)
120 HSET(160+X,96+Z)
130 Z=Z-1:GOTO 80
140 HSET(160-X,96-Y)
150 HSET(160+X,96-Y)
160 HSET(160-X,96+Y)
170 HSET(160+X,96+Y)
180 Z=Y-1:NEXT X
190 HLINE(160,0)-(160,96),PSET
200 FOR I=0 TO N
210 B=A
220 A=A+6.28318*F(I)
230 AA=A:R=96:GOSUB 350:S=SGN(X)
240 XX=160+X:YY=96-Y
250 HLINE(160,96)-(XX,YY),PSET
260 AA=A-(A-B)/2:R=48:GOSUB 350
270 HPAINT(160+X,96-Y),C(I),1
280 R=96:GOSUB 350
290 HLINE(160+X,96-Y)-(160+SGN(X
)*96,96-Y),PSET
300 X=0:Y=INT((96-Y)/8)
310 IF A<3.1416 THEN X=40-LEN(S$
(I))
320 HPRINT(X,Y),S$(I)
330 NEXT I
340 GOTO 340
350 X=INT(R*SIN(AA)+.5)
360 Y=INT(R*COS(AA)+.5)
370 RETURN
380 DATA .07142857143,2,COLOR 2
390 DATA .07142857143,3,COLOR 3
400 DATA .07142857143,4,COLOR 4
410 DATA .07142857143,5,COLOR 5
420 DATA .07142857143,6,COLOR 6
430 DATA .07142857143,7,COLOR 7
440 DATA .07142857143,8,COLOR 8
450 DATA .07142857143,9,COLOR 9
460 DATA .07142857143,10,COLOR 1
0
470 DATA .07142857143,11,COLOR 1
1
480 DATA .07142857143,12,COLOR 1
2
490 DATA .07142857143,13,COLOR 1
3
500 DATA .07142857143,14,COLOR 1
4
510 DATA .07142857143,15,COLOR 1
5
```

SPECIAL EVENT!

COCO GALLERY LIVE
SHOWCASE YOUR BEST AT RAINBOWFEST

We are taking the popular "CoCo Gallery" on the road to RAINBOWfest Chicago — and we'd like you to submit your own graphics creations to be exhibited at the show!

RULES

- You can enter color or black-and-white photographs or printouts of your original artwork produced on the CoCo 1, 2 or 3. Entries should be framed, mounted or matted, and may not be smaller than 5-by-7 inches or larger than 11-by-14 inches.
- Don't send us anything owned by someone else; this means no game screens, digitized images from TV programs or material that's already been submitted elsewhere. A digitized copy of a picture that appears in a book or magazine is ***not*** an original work.
- Along with your entry, send a cover letter with your name, address and phone number, detailing how you created your picture (what programs you used, etc.). Please include a few facts about yourself, too!
- Your name, address and phone number, along with the title of your work, must be clearly marked on the back of each entry, and a disk copy of each piece must also be included.
- Entries may be mailed to THE RAINBOW before May 1, 1988, or brought to the RAINBOWfest registration booth by 10 a.m., Saturday, May 21.
- Your work will be returned if sent with a postage paid return envelope, or entries can be picked up at the close of the show — Sunday, May 22, at 4 p.m.

There will be two categories: one for graphics produced on the CoCo 1 and 2, and one for CoCo 3 graphics. Several awards will be made in each category. Winners will be determined by votes from RAINBOWfest attendees. In case of any ties, winners will be determined by our chief judge, CoCo Cat.

Prizes and ribbons will be presented Sunday, May 22, and winning entries will be published in the September '88 issue of THE RAINBOW. Send your entry to "CoCo Gallery Live," THE RAINBOW, 9509 U.S. Highway 42, Prospect, KY 40059.

RAINBOW FEST®
CHICAGO MAY 20-22

RAINBOWfest is the only computer show dedicated exclusively to your Tandy Color Computer.

Nowhere else will you see as many CoCo-related products or be able to attend free seminars conducted by the top Color Computer experts. It's like receiving the latest issue of THE RAINBOW in your mailbox!

RAINBOWfest is a **great opportunity** for commercial programmers **to show off new and innovative products for the first time. Chicago is the show** to get information on capabilities for the new CoCo 3, along with a terrific selection of the latest CoCo 3 software. In exhibit after exhibit, there will be demonstrations, opportunities to experiment with software and hardware, and special RAINBOWfest prices.

Set your own pace between visiting exhibits and attending the valuable, free seminars on all aspects of your CoCo — from improving BASIC skills to working with the sophisticated OS-9 operating system.

Many people who write for THE RAINBOW — as well as those who are written about — are there to meet you and answer questions. You'll also meet lots of other people who share your interest in the Color Computer. It's a person-to-person event and a tremendous learning experience in a fun and relaxed atmosphere.

A special feature of RAINBOWfest is the **Educational Sandbox,** which features **child-oriented workshops** to give hands-on experience to an age group often neglected. There are sessions for the kindergarten through third-graders, and for fourth- through seventh-graders. And, as an additional treat for CoCo Kids of all ages, we've invited frisky feline CoCo Cat to join us for the show. RAINBOWfest has something for everyone in the family!

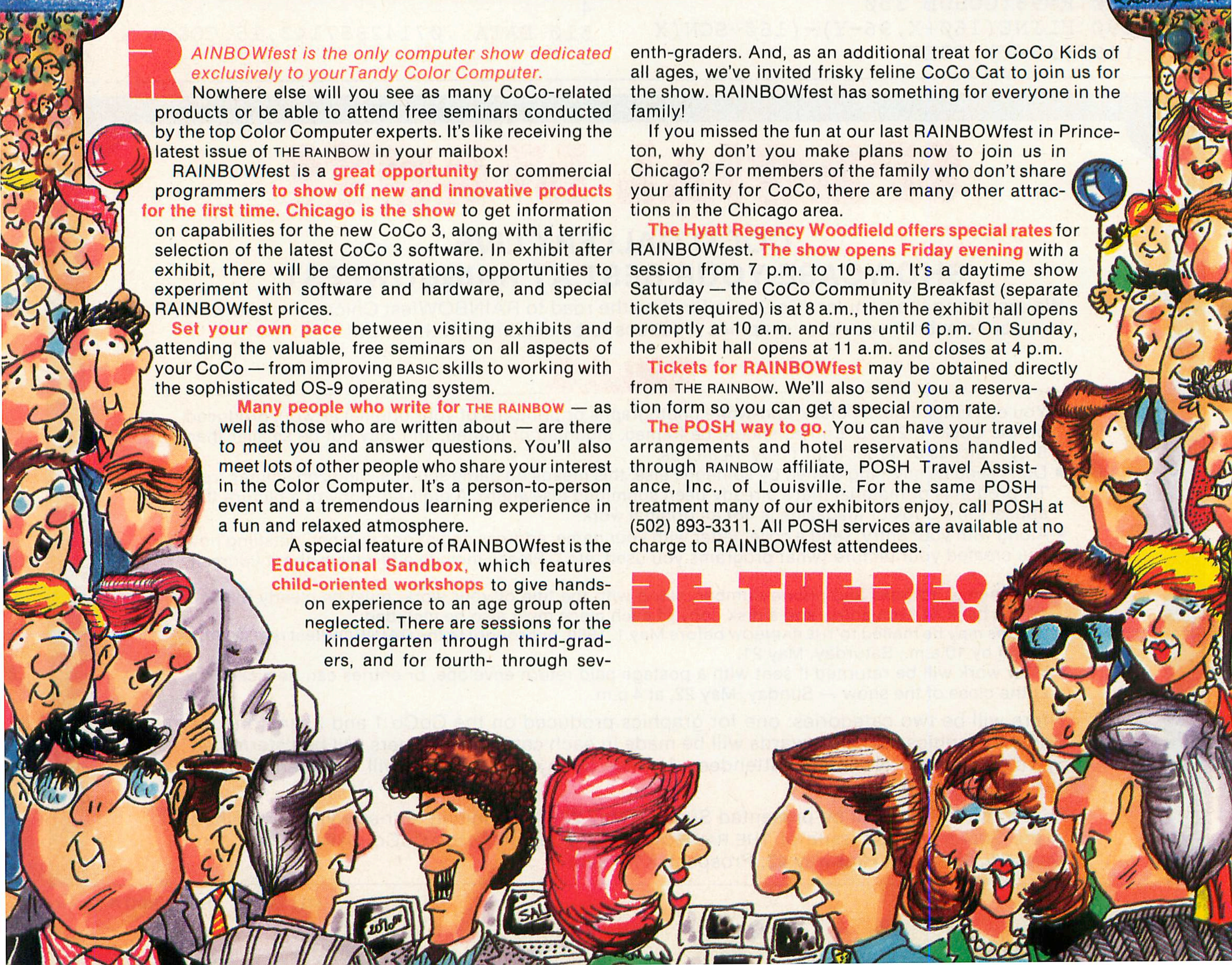
If you missed the fun at our last RAINBOWfest in Princeton, why don't you make plans now to join us in Chicago? For members of the family who don't share your affinity for CoCo, there are many other attractions in the Chicago area.

The Hyatt Regency Woodfield offers special rates for RAINBOWfest. **The show opens Friday evening** with a session from 7 p.m. to 10 p.m. It's a daytime show Saturday — the CoCo Community Breakfast (separate tickets required) is at 8 a.m., then the exhibit hall opens promptly at 10 a.m. and runs until 6 p.m. On Sunday, the exhibit hall opens at 11 a.m. and closes at 4 p.m.

Tickets for RAINBOWfest may be obtained directly from THE RAINBOW. We'll also send you a reservation form so you can get a special room rate.

The POSH way to go. You can have your travel arrangements and hotel reservations handled through RAINBOW affiliate, POSH Travel Assistance, Inc., of Louisville. For the same POSH treatment many of our exhibitors enjoy, call POSH at (502) 893-3311. All POSH services are available at no charge to RAINBOWfest attendees.

BE THERE!



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COCO COMMUNITY BREAKFAST

Dan Bruns — President, General Videotex Corporation

Our keynote speaker for the traditional CoCo Community Breakfast is Dan Bruns, president and chief executive officer of General Videotex Corporation (Delphi). Formerly a systems analyst for Sperry Univac, Mr. Bruns has helped Delphi grow into a major telecomputing information service and an important meeting place for the CoCo Community.

SPECIAL EVENT!

We're pleased to present The Educational Sandbox, a joint Tandy/RAINBOW effort. This is a computer workshop for RAINBOWfest kids. There will be two sessions on both Saturday and Sunday. One workshop will be for the kindergarten through third-grade set, and the other for fourth- through seventh-graders. Each workshop will last between 45 minutes and one hour, and will give the children and their parents hands-on experience in using Tandy computers and software.

RAINBOWfest - Chicago, Illinois
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Sign-In,
Please!

By Jim Bennett

A graphics program called *Signature* makes it possible for you to use your CoCo to create an exact rendering of your signature, logo or similar design and then print it on paper. Designs may also be saved on disk or tape for future use in personalizing stationery or business forms.

Signature is very user-friendly. It demonstrates how PMODE4 graphics can be used to tremendous advantage and how to write a screen dump routine (the part of the program that tells your printer to print your signature). REM statements in the program listing help identify the various program parts as well as indicate specific lines of importance.

The program was written for a Radio Shack DMP-105 printer and should also run on the newer DMP-106. The screen dump can be modified for use with any printer that prints a standard seven-dot column. If you are unsure whether or not your printer prints a seven-dot column, refer to your printer operation manual.

The program is not very long and should not be difficult to key in. Nevertheless, you should use care to avoid typing mistakes, being especially careful to type lines 570 through 600 exactly as listed. Typographical errors in these lines will very likely produce FC Errors in Line 680, which relies on correct DATA statements to make the program run properly. Unlike easy-to-locate Syntax (SN) Errors, the source of a functional error can be very difficult to track down, since it most often will show up in a line that is error-free. Also take the precaution of saving the program before you attempt to run it the first time.

When you run the program, you should see the title written in script at the very top of the screen, a horizontal rectangle that is the writing space, and underneath, a menu of five options initiated by pressing the number keys 1 through 5. From the menu you may choose to write a signature, load a previously saved signature, save the one currently displayed in the writing space, print it, or erase it and start over again.

This program's method of writing text on the graphics screen will be familiar to experienced programmers. It is widely used; however, the version presented here is as short and simple as you'll find anywhere. In Line 610 the data for drawing the text characters is put into two arrays (numbers and letters). Then whenever it is necessary to put text on the screen, the program will first define the line of text together with the horizontal and vertical coordinates showing where the text should go (T$, H$, V$). Next it goes to the subroutine

---

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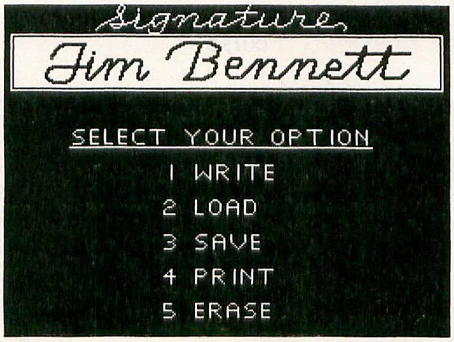
in lines 640 through 690, which uses the ASCII codes of the individual numbers and letters to draw the correct characters on the screen.

If you select Option 1 from the menu, the menu quickly disappears. In its place appears an impressive diagram of the keys used for writing. The commands that draw the diagram, as well as the title script, were created using the graphics utility, *Leonardo's Pencil*. The arrows in the diagram show the eight directions that the cursor can be moved when you press the keys, giving you precise control over the movement of the cursor. Holding down the ENTER key will cause the cursor to make a mark wherever it moves, pressing U for "undo" will erase previous marks, and pressing the M key will return you to the menu. Note, however, that you do not have to return to the menu to initiate options 2 through 5.

Observe how quickly the screen changes when you go from the menu to the writing option or back to the menu again. The technique for erasing the menu portion of the screen while leaving the writing space untouched is based on the fact that the writing space at the top takes up the first page of the `PMODE4` graphics screen, while the area below it occupies pages 2 through 4. In order to erase the space quickly, a copy of the blank, lower three-quarters of the screen is first `PCOPY`ed to graphics pages 5 through 7 (Line 30). Afterwards, the program simply `PCOPY`s pages 5 through 7 back to pages 2 through 4 (Line 880); in the blink of an eye, the area is erased!

If you have difficulty getting the cursor to write exactly the way you want (after all, using the keys isn't quite the same as "clicking your Bic!"), you might prefer the following technique for getting an exact rendering of your signature. Use a wax marking pen to write in the space directly on your monitor screen. This will serve as a guide that can be cleaned off after you are done. With a written guide in place, you can carefully trace underneath. Practice and you can become really proficient in using the keys to move the cursor exactly where you want it to go.

During the writing routine (lines 80 through 270), the program employs two methods of monitoring the keys that are pressed. The `INKEY` function checks the directional control keys and the M key. Two peeks, `PEEK 338` and `PEEK 343`, are used to check the ENTER and U keys, respectively. The difference is that the `INKEY` function will recognize only once that a key has been pressed. It will not tell you if a key is being held down, nor will it recognize that more than one key is being pressed. By peeking at the locations in memory for the ENTER and U keys, it can be determined if they are being held down and also if they are being pressed simultaneously with another key.



Signature

Jim Bennett

SELECT YOUR OPTION
1 WRITE
2 LOAD
3 SAVE
4 PRINT
5 ERASE

Every time a mark is made, Line 150 pokes the horizontal and vertical coordinates of the cursor position into a location in high memory that was protected by a `CLEAR` command at the beginning of the program. These pokes create a record of what has been written so that when you want to "undo" something, the program can peek back into the record (Line 160) and erase the previous marks. Holding the U key will "undo" until you release the key.

The `LOAD` and `SAVE` options are easy and fast, because again we take advantage of the fact that the first page of the graphics screen covers the writing space. Therefore, it is necessary only to save and load the one page. This is a noticeable timesaver, especially when you are using tape.

When you are loading or saving, it is important to have the disk or tape ready. The program will automatically recognize in Line 900 the system being used by checking the amount of available memory (the tape system has more bytes of RAM than the disk system does) and then displaying the appropriate onscreen prompt, `READY DISK` or `READY TAPE`. If you are using a tape system, you will have to delete lines 760 and 805 from the program. Also remove the apostrophes at the beginnings of lines 770 and 860. This will cause the `LOAD` and `SAVE` routines to work with tape.

When you are asked to give the name of the signature you are loading or saving, type the name slowly; it will appear in the name box on the screen (the maximum length is eight letters). If you should make a mistake in spelling, use the left arrow to backspace. When the name is typed correctly, press ENTER and the option will execute.

Signature keeps the graphics screen in view during the entire running of the program. From the programming standpoint, it certainly would have been far easier to simply shift to the text screen during the `LOAD` and `SAVE` options. However, switching back and forth between graphics and text screens *does* give the program a really unfriendly appearance. For instance, if I had just spent a lot of effort creating a graphic and then suddenly saw it vanish before my eyes as the program changed to a text screen for the `SAVE` option, I would be at least a little concerned about the status of my graphic. To make things friendly (which in the case of a computer program means helpful, predictable and reassuring), routines in this program were designed to keep all the operations on the one screen.

If you select the print option, you will first be reminded to turn on the printer. Then you will be given a choice of five places, from left to right, where the signature can be printed on the paper. Once the placement is selected, the printer should begin working on the task of printing your signature.

The screen dump, contained in lines 290 through 460, is neither long nor especially complicated. Line 290 commands the printer to use condensed character and the graphics mode, to ready the print head, and to identify the last dot column on the page. Line 350 prints an appropriate number of blank spaces to position the signature properly. In lines 340 through 460 the routine uses two nested `FOR-NEXT` loops to scan the writing space horizontally and vertically. For each one-pixel horizontal advance, a vertical column of seven pixels is checked with the `PPOINT` function (lines 380 through 440).

The printer has a control code number for every one of the possible 127 combinations of dots in a column! By assigning the values of 1-2-4-8-16-32-64 to each of the seven positions, respectively, it is possible to represent all these combinations numerically. The sum of the dots in the column added to 128, the number for a blank column (no dots), will be the control code; this tells the printer the exact configuration to print. For example, `CHR$(129)` tells the printer to print only one dot in the top position (128+1); `CHR$(192)` tells the printer to print only one dot in the last position in the column (128+64).

Line 450 tells the printer to print a dot column duplicating the seven-pixel column that has just been scanned. Line 460 uses a carriage return to advance to the next horizontal row.

When you look at how the screen dump works, it might appear that the printer is kept very busy printing little columns of dots on the paper one by one until the job is done. However, that is not the way the printer handles the job. Instead of printing the columns one at a time, it gathers a number of them together and prints them as a unit. So when the screen dump operates, the printer prints a section, pauses, prints another section, pauses again, and so on until the job is finished.

If you do not have a DMP-105 or DMP-106 but your printer does print a seven-dot column, it should not be too difficult to modify the screen dump to work with your printer. Simply use your printer operation manual to find out the six printer commands that are used in the screen dump routine (see Table 1). Also verify that your printer uses the same numbering system for naming the arrangement of dots in the columns. Then change the commands in the routine to fit your printer. Make absolutely certain to include all the necessary semicolons with your commands so you don't get unwanted carriage returns. Analyzing and modifying this routine should be extremely helpful in gaining an understanding of the graphics capabilities of the CoCo and your printer.

Variables

N$(0-9)	Numbers	V	Vertical position of cursor
L$(0-25)	Alphabet	L	Key pressed
C	Cursor	S	Blank spaces
CC	Location where H and V are poked	L$	Character in T$
H$	Horizontal location	N$	Name of signature
V$	Vertical location	D	Dot pattern
T$	Line of text		
H	Horizontal position of cursor		

Printer Commands

CHR$(27);CHR$(20)	Selects condensed character
CHR$(18)	Selects graphics mode
CHR$(27);CHR$(16)	Ready print head
CHR$(3);CHR$(31)	Specifies last dot column
CHR$(128-255)	Dot configuration in a column
PRINT#-2	Carriage return

Table 1

As stated at the beginning, *Signature* is a good example of how to make a program very user-friendly. Perhaps you can think of ways to add your own touches to this program to make it even friendlier. Perhaps you will be inspired to create more user-friendly programs of your own. There is no such thing as a program that can't be made friendlier, and the extra effort that is put into creating the program can take a lot of the effort out of using it.

(Questions or comments regarding this program may be directed to the author at Hutton and Orchard Sts., Rhinecliff, NY 12574. Please enclose an SASE when requesting a reply.) ☐

120	36	580	49
250	113	690	28
360	134	810	22
510	69	END	153

The listing: SIGNATUR

```
10 '******************************
 SIGNATURE BY JIM BENNETT, 1988
*******************************
20 CLEAR500,22000:PCLEAR7:PMODE4
,1:PCLS0:SCREEN1,1:COLOR1:DIML$(
25),C(2,2):CC=22000:GOSUB560
30 LINE(4,17)-(251,49),PSET,B:LI
NE(6,19)-(249,47),PSET,BF:FORP=2
TO4:PCOPYP TOP+3:NEXTP:GOSUB470
40 H$="40":V$="80":T$="SELECT YO
UR OPTION":GOSUB640:LINE(38,82)-
(211,82),PSET:H$="96":V$="100":T
$="1 WRITE":GOSUB640:H$="92":V$=
"120":T$="2 LOAD":GOSUB640:V$="1
40":T$="3 SAVE":GOSUB640
50 V$="160":T$="4 PRINT":GOSUB64
0:V$="180":T$="5 ERASE":GOSUB640
60 I$=INKEY$:IFI$=""ORI$<"1"ORI$
>"5"THEN60ELSEIFI$="2"THEN710ELS
EIFI$="3"THEN800ELSEIFI$="4"THEN
280ELSEIFI$="5"THENGOSUB890:GOTO
60
70 '*********WRITE*************
80 GOSUB880:H$="20":V$="100":T$=
"UNDO":GOSUB640:V$="120":T$="MEN
U":GOSUB640:GOSUB500
90 H=8:V=34
100 PUT(H,V)-(H+1,V+1),C,NOT:PUT
(H,V)-(H+1,V+1),C,NOT
110 I$=INKEY$:IFI$=""THEN100
120 L=INSTR("OP@L;,./",I$):IFL=0
ANDI$<>CHR$(13)ANDI$<>"M"ANDI$<>
"U"AND(I$<"2"ORI$>"5")THEN100
130 IFI$="2"THEN710ELSEIFI$="3"T
HEN800ELSEIFI$="4"THEN280ELSEIFI
$="5"THENGOSUB890:GOTO110:ELSEIF
I$="M"THENGOSUB880:GOTO40
140 ONL GOSUB200,210,220,230,240
,250,260,270
150 IFPEEK(338)<200THENCOLOR0:LI
NE(H,V)-(H+1,V+1),PSET,BF:POKECC
,H:POKECC+1,V:CC=CC+2:IFCC=32000
THENCC=22000
160 IFPEEK(343)=251ANDCC>22000TH
ENCOLOR1:H=PEEK(CC-2):V=PEEK(CC-
1):LINE(H,V)-(H+1,V+1),PSET,BF:C
C=CC-2:SOUND60,2:SOUND100,2:POKE
```

```
343,255
170 IFH<6THENH=6ELSEIFH>247THENH
=247
180 IFV<19THENV=19ELSEIFV>46THEN
V=46
190 GOTO100
200 H=H-1:V=V-1:RETURN
210 V=V-1:RETURN
220 H=H+1:V=V-1:RETURN
230 H=H-1:RETURN
240 H=H+1:RETURN
250 H=H-1:V=V+1:RETURN
260 V=V+1:RETURN
270 H=H+1:V=V+1:RETURN
280 '******PRINT SIGNATURE******
285 GOSUB880:H$="54":V$="100":T$
="TURN ON PRINTER":GOSUB640:H$="
64":V$="120":T$="PRESS ANY KEY":
GOSUB640:EXEC44539
290 PRINT#-2,CHR$(27);CHR$(20);C
HR$(18);CHR$(27);CHR$(16);CHR$(3
);CHR$(31);:'PRINTER CODES FOR
CONDENSED CHARACTER SET, GRAPH-
ICS MODE, READY PRINT HEAD, AND
SPECIFYING LAST DOT COLUMN
300 GOSUB880:H$="16":V$="80":T$=
"SELECT POSITION ON PAPER":GOSUB
640:H$="78":V$="100":T$="1 FAR L
EFT":GOSUB640:H$="74":V$="120":T
$="2 1/3 OVER":GOSUB640:V$="140"
:T$="3 CENTER":GOSUB640
310 V$="160":T$="4 2/3 OVER":GOS
UB640:V$="180":T$="5 FAR RIGHT":
GOSUB640
320 I$=INKEY$:IFI$=""ORI$<"1"ORI
$>"5"THEN320ELSES=133*(VAL(I$)-1
):SCREEN1,1:GOSUB880:H$="26":V$=
"110":T$="NOW PRINTING SIGNATURE
":GOSUB640
330 PRINT#-2
340 FORV=19TO40STEP7
350 FORX=0TOS:PRINT#-2,CHR$(128)
;:NEXTX:'SPACING TO RIGHT
360 FORH=6TO248
370 D=128:'ADD UP DOTS IN COLUMN
380 IFPPOINT(H,V)=0THEND=D+1
390 IFPPOINT(H,V+1)=0THEND=D+2
400 IFPPOINT(H,V+2)=0THEND=D+4
410 IFPPOINT(H,V+3)=0THEND=D+8
420 IFPPOINT(H,V+4)=0THEND=D+16
430 IFPPOINT(H,V+5)=0THEND=D+32
440 IFPPOINT(H,V+6)=0THEND=D+64
450 PRINT#-2,CHR$(D);
460 NEXTH:PRINT#-2:NEXTV:SCREEN1
,1:GOSUB880:GOTO40
470 '*******WRITE TITLE*********
480 DRAW "BM51,14;S4C1BR2E3RERER
ERERERUEUEUHLGDGDFDFDFD2G2L3H2R9
ER2EREUEUBU2UBD5DGDGDFR3EREREREUE
UERER6BL2BG3BHBL4BD3BRD2RE2REREU
ED2GDGDGDG2L5HUBR2BE6BR6RE2R3DGD
GDGBE3E3RER2FDGDGD2R4ERERE2UE2R6
BL4BG3BLBGD3RERERE2UEDGDGD2R3ERE
REREREREUEUEUEBLBG3
490 DRAW "BL3BGR12BL6BGBLBGBR2D2
GDGFR4EREREREUEUBGBD3GD2R4EREREU
EU2BGBD4DFR3EREREUEUEU2BD2FR4DGD
GF2R6EREREREUEULHLGDG2D2F2R7ERER
2F2DG":RETURN
500 '********DRAW KEYS**********
510 DRAW"BM86,75C1S4D23R27U23L27
BH2H9D7BU7R7BUBF12BDBF2BDL3G2D4F
2R2E2U4HBR29BUD19R28U23L28D4BFBR
5D8BEBU2UR3"
520 DRAW "E2UH2L4BRBE3BR4BU4U9G6
BR7BU5F4BR9BF6BR6BDBUBDD23R28U23
L27BF4BD7U5E2R4FD6GL3U4R2BRBE7BR
8BE4E9L7BF4BE3D6BLBG33BUBL38BDBG
4BLBG2BLL28D24R28U23BLBG2BL19D8R
5BRBL13BDBL3L10E5BEBG6F5BR49D7R2
9U24L29D17BE7BLBU5BRBUUD7BH3LR8B
G3BDBGBD2DBD3D2G2
530 DRAW "BR7BE10BR11R10G5BE5H5B
R9D17R52U23L52D6BF2BR5D6R4BU3L3B
U3R3BR4D6BRBU6F2DF3U6BR3R7BDBL3D
5BR10L4U3R4BL4U3R4BR3D6BEBU5R2FD
2GL2BRF2RBLBG17BL21BDL30D24R30U2
3BGBL22BG2BDDUE2R2F2D2G2LD2BD2DB
D5BG2E7BDBF9BRBF2BR5BFBR2F8BUU7B
```

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```
D8L8BL40BH7BU4U24
540 DRAW "L30D24R29BRBLBH21BL3F4
G4BD7BRDBDBF5BRBFBR2BUBD3D8E6BL6
BD6H5BL12BH7BL4U24L31D23UD2R30BH
20BUBLG5F4BD6DG2BG3BL3BG3G8U7BD7
R6BR"
550 RETURN
560 '******TEXT CHARACTERS******
570 DATA BUNFU2ERFD2GNLBR4,NU4BR
3,BU3ERFGLGDR3BR2,BU4R2FGNLFGNL2
BR3,BU2NE2R2NU2NRD2BR3,BU4NR2D2R
2FGNL2BR3,BUNFUNE2R2FGLBR4,BU4R3
G3DBR5,BRHEREHLGFRFGNLBR3,BU3NFE
RFDNLNG2BD2BR2
580 DATA U3ERFDNL3D2BR2,U4R2FGNL
2FGNL2BR3,BU4BR3L2GD2FR2BR2,U4R2
FD2GNL2BR3,BU4NR2D2NR2D2R2BR2,BU
4NR2D2NR2D2BR4,BU4BR3L2GD2FR2NU2
BR2,U2NU2R3NU2D2BR2
590 DATA BRNU4BR2,BR2BU4D3GLBR4,
U2NU2RNE2F2BR2,NU4R2BR2,U4F2NDE2
D4BR2,U4F3NU3DBR2,BUNFU2ERFD2GNL
BR3,U4R2FGNL2BD2BR3,BUNFU2ERFD2G
NLR2BR2,U4R2FGLNLF2BR2
600 DATA BU4BR3L2GFRFGNL2BR3,BR2
U4NL2R2BD4BR2,BUNFU3BR3D3GNLBR3,
BU2NU2F2E2NU2BD2BR2,NU4E2F2NU4BR
2,UE3BL3F3DBR2,BU4F2NE2D2BR4,BU4
R3G3DR3BR2
610 FORX=0TO9:READN$(X):NEXT:FOR
X=0TO25:READL$(X):NEXT
620 RETURN
630 '********WRITE TEXT*********
640 DRAW"BM"+H$+","+V$+"C1S8":FO
RX=1TOLEN(T$)
650 L$=MID$(T$,X,1):IFL$=" "THEN
DRAW"BR4":GOTO690
660 IFL$="/"THENDRAW"NE4BR6":GOT
O690
670 IFL$<"A"THENDRAWN$(ASC(L$)-4
8):GOTO690
680 DRAWL$(ASC(L$)-65)
690 NEXTX:RETURN
700 '******LOAD ROUTINE*********
710 GOSUB880:H$="58":V$="75":T$=
"LOAD SIGNATURE":GOSUB640:LINE(5
6,78)-(192,78),PSET:GOSUB900:H$=
"18":V$="120":T$="TYPE AND ENTER
 THE NAME":GOSUB640:H$="72":N$="
":COLOR1:LINE(78,128)-(164,144),
PSET,B
720 I$=INKEY$:IFI$=""ORINSTR(CHR
$(13)+CHR$(8)+"1234567890QWERTYU
IOPASDFGHJKLZXCVBNM/ ",I$)=0THEN
720ELSEH$=STR$(VAL(H$)+10):V$="1
40":T$=I$
730 IFI$=CHR$(8)ANDN$<>""THENFOR
U=1TO10:DRAW"BM"+H$+",140C0LNU4"
:H$=STR$(VAL(H$)-1):NEXTU:H$=STR
$(VAL(H$)-10):N$=LEFT$(N$,LEN(N$
)-1):GOTO720:ELSEIFI$=CHR$(8)THE
NH$=STR$(VAL(H$)-10):GOTO720:ELS
EIFI$=CHR$(13)THEN750
740 IFLEN(N$)<8THENGOSUB640:N$=N
$+I$:GOTO720
750 'LOADING
760 LOADMN$:'OMIT THIS LINE IF
USING TAPE
770 'CLOADMN$:'DELETE THE FIRST
APOSTROPHE IF USING TAPE
780 GOSUB880:GOTO40
790 '******SAVE ROUTINE*********
800 GOSUB880:H$="58":V$="75":T$=
"SAVE SIGNATURE":GOSUB640:LINE(5
6,78)-(192,78),PSET:GOSUB900:H$=
"18":V$="120":T$="TYPE AND ENTER
 THE NAME":GOSUB640:H$="72":N$="
":COLOR1:LINE(78,128)-(164,144),
PSET,B
810 I$=INKEY$:IFI$=""ORINSTR(CHR
$(13)+CHR$(8)+"1234567890QWERTYU
IOPASDFGHJKLZXCVBNM/ ",I$)=0THEN
810ELSEH$=STR$(VAL(H$)+10):V$="1
40":T$=I$
820 IFI$=CHR$(8)ANDN$<>""THENFOR
U=1TO10:DRAW"BM"+H$+",140C0LNU4"
:H$=STR$(VAL(H$)-1):NEXTU:H$=STR
$(VAL(H$)-10):N$=LEFT$(N$,LEN(N$
)-1):GOTO810:ELSEIFI$=CHR$(8)THE
NH$=STR$(VAL(H$)-10):GOTO810:ELS
EIFI$=CHR$(13)THEN840
830 IFLEN(N$)<8THENGOSUB640:N$=N
$+I$:GOTO810
840 'SAVING
850 SAVEMN$,3584,5119,3584:'OMIT
THIS LINE IF USING TAPE
860 'CSAVEMN$,1536,3071,1536:'
DELETE FIRST APOSTROPHE IF USING
TAPE
870 GOSUB880:GOTO40
880 SOUND120,1:FORP=5TO7:PCOPYP
TOP-3:NEXTP:RETURN:'ERASE
890 CC=22000:COLOR1:LINE(6,19)-(
249,47),PSET,BF:RETURN:'CLEAR
900 H$="78":V$="100":IFMEM<2000T
HENT$="READY DISK"ELSET$="READY
TAPE"
910 GOSUB640:RETURN
```

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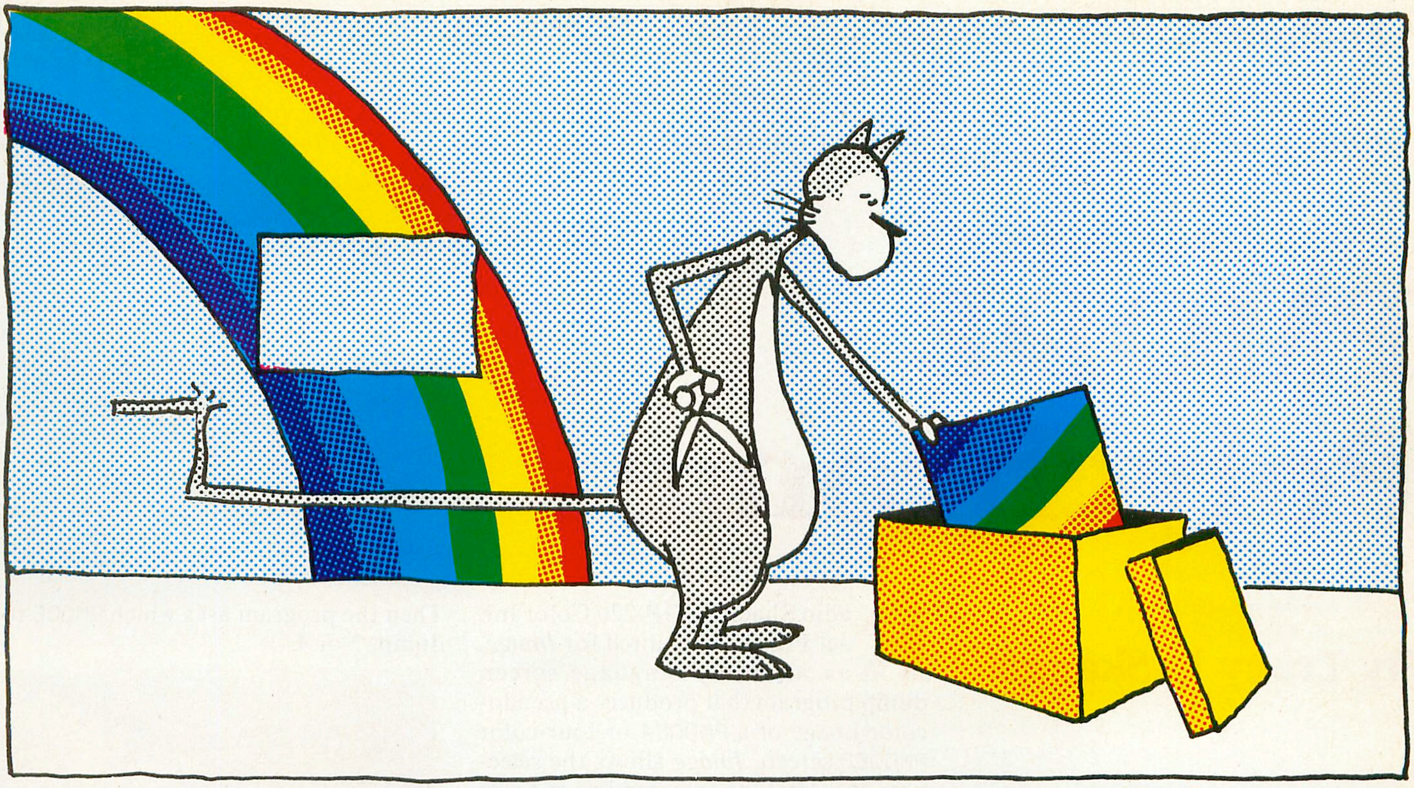

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Dump your PMODE 3 and 4 screens in color

PMODE Polychrome

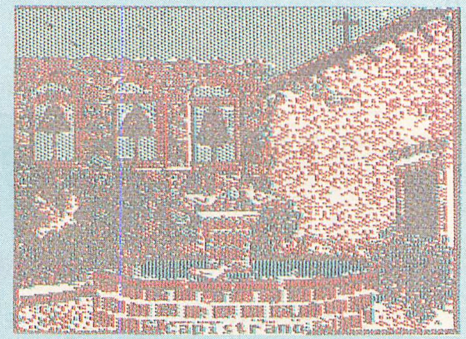
By Tracy L. Skaggs

Radio Shack's CGP-220 Color Ink Jet Printer is required for *Image*, an assembly language screen dump program that produces a pseudo-color image of a PMODE4 or four-color PMODE3 screen. *Image* allows the selection of a small or enlarged image to be printed, as well as the particular color translation from screen to printer.

Before running *Image*, be sure to clear enough space for it at the top of available RAM. For 32K this is CLEAR 200,&H7B2B, and for 16K it is CLEAR 200,&H3B2B (see the end of the article for particulars on modifying *Image* for 16K). When the program is executed (&H7BF6 for 32K and &H3BF6 for 16K), the title screen appears along with the question ENLARGE?. A response of Y will result in an enlarged dump, while a response of N prints a small image.

Tracy Skaggs, a junior computer science major, is a self-taught programmer who has enjoyed his CoCo for six years. His other interests include science fiction, stargazing and biking.

Then the program asks which PMODE to dump, 3 or 4.



If PMODE 4 is selected, the program asks if you want to translate even pixels (0,2,4,6, . . .) or odd pixels (1,3,5,7, . . .) as red, and if you want, set pixels on the screen to print as white (non-printing) or black (printing). If PMODE 3 is chosen, *Image* asks you to choose the printing colors for the four possible pixel values 0, 1, 2 and 3. Any combination of the eight printer colors is valid. Following these queries, *Image* begins to dump the screen; when that is finished, the program restarts.

Although fully documented, there are

To produce 8 dots of the 8 possible colors:

Red Data	0	1	0	1	0	1	0	1
Green Data	0	0	1	1	0	0	1	1
Blue Data	0	0	0	0	1	1	1	1
Produces	Black	Red	Green	Yellow	Blue	Magenta	Violet	White

Figure 1

some routines that may require more in-depth explanation. *Image* has 16 major routines listed in Table 1 along with a short description of what they do. While most of these are easily understood, six of them are less straightforward.

Routines

The routines `PMOD3` and `PMOD4` process the graphics screen, line by line, and dump the resulting data to the printer. The method used by the CGP-220, called the color-scan mode, is fairly simple. This mode is not much different from a normal dot-addressable graphics mode. However, instead of printing the data in a vertical column of seven or eight dots, it prints an eight-dot horizontal row. Also, when the mode is selected, a value is given indicating how many of these eight-dot rows are to be printed on one line. The color of each dot is determined by RGB color mixing, so for any one line consisting of 32 eight-dot rows, the printer requires 96 bytes to be sent: 32 bytes of red data, 32 bytes of green data and 32 bytes of blue data. Refer to Figure 1 to see how the eight different colors can be attained.

`PMOD3` and `PMOD4` scan the screen line and examine a pixel to determine what color it should print (a pixel is a group of bits: In `PMODE 3` these groups are two bits wide and in `PMODE 4` they are one bit wide). `PMOD3` calculates the value of the current pixel (0-3) and calls the routine `COLOR` that determines the proper printer color for the pixel. `PMOD4` does nearly the same thing, except it keeps track of whether the pixel is odd or even and if the last bit was set or reset. This is required to reproduce the color artifacting as seen on the screen: If the current pixel is odd and the previous bit was not set, it will print as red (or blue, depending on your selection). If the previous bit was set, then this pixel will print as white (or black, depending on your selection).

The routines `SETCLR` and `COLOR` are used by `PMOD3` to produce the proper color for each of four possible pixel values. `SETCLR` is called to select the four colors corresponding to the pixel values. `COLOR` is called to do the actual setting of the values in the red, green and blue color buffers. To accomplish this, a series of tables is used. The first, `CTABLE`, holds four bytes having the values 0-7 corresponding to the eight available colors. The values act as an offset in the second table. This table, `JTABLE`, is simply eight addresses pointing to the eight color routines in lines 02400-02920.

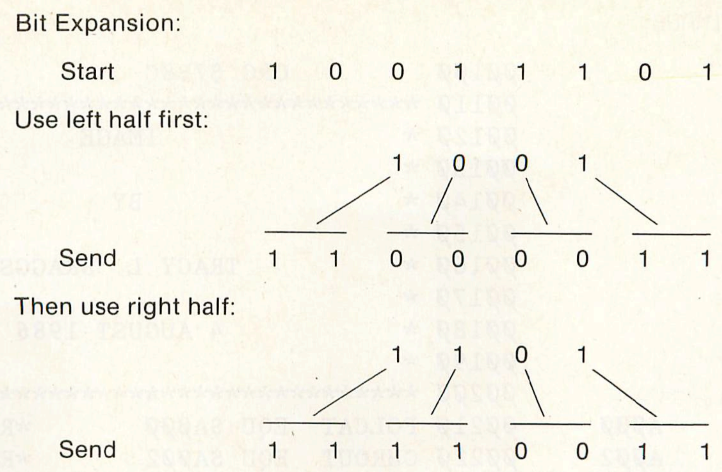


Figure 2

`PSEUDO` is the routine that asks what pixels, odd or even, will be printed red and whether to print set pixels as black or white. After getting a response, `PSEUDO` modifies `PMOD4` in two places. `MODIF1` and `MODIF2` are given the address of the routine for black or white, and `MODIFY` is toggled between `BEQ` (if even is to be red) and `BNE` (if odd is to be red). Note that the artifact color blue is printed as violet in Line 01540. This is because the violet ink looks more like the artifact blue than the blue ink does. If you don't agree, change it.

Finally, `ENLARG` modifies the color data so that as it is sent to the printer, each separate bit is expanded into two bits. The method used here may not be the most eloquent, but it is the first one that worked. The routine expands first the left and then the right half of the byte. After each half is expanded, it is sent to the printer. See Figure 2.

Modifications

The assembly listing is shown assembled by Radio Shack's *EDTASM+* (as patched for disk in THE RAINBOW by Roger Schrag) for a 32K Disk ECB CoCo. However, to assemble it for 16K simply change the origination address at Line 00100 from `$7B8C` to `$3B8C`. If you do not have a disk system, you must change the start and end addresses for the graphics screen. These are in lines 00330 and 00340 and should be changed to `$0600` and `$1E00`, respectively. To print graphics from another location, you can modify these addresses to point wherever you want.

(Questions or comments regarding this program may be directed to the author at 1815 East 5th St., Milan, IL 61264. Please enclose an SASE when requesting a reply.)

Table 1

START	Initializes baud rate (1=9600, 6=4800, 18=2400, 41=1200, 87=600, 180=300), screen output, and clears the screen.
TPAGE	Asks opening questions.
PMOD3	Dumps a `PMODE 3` screen.
COLOR	Selects proper color.
PMOD4	Dumps a `PMODE 4` screen.
SETX	Points X to the current byte in the color buffers.
POWERS	Generates the powers of 2 for bit manipulation.
BLACK, WHITE, RED, GREEN, BLUE, YELLOW MAGENTA, VIOLET	Color routines.
SETCLR	Asks how to translate colors to the printer.
DUMP0	Dumps the color buffers to the printer.
ENLARG	Enlarges bytes being sent to the printer if requested.
CLEAR0	Clears the contents of the color buffers of old data.
GRAFIX	Sends setup values to the printer for color scan mode.
PRINT	Prints a message beginning at X on the screen.
GETKEY	Gets a response from the keyboard, loops indefinitely until a response is given. ☐

The listing: IMAGE

```
7B8C                 00100         ORG $7B8C
                     00110 *****************************************
                     00120 *                IMAGE                  *
                     00130 *                                       *
                     00140 *                 BY                    *
                     00150 *                                       *
                     00160 *           TRACY L. SKAGGS             *
                     00170 *                                       *
                     00180 *            4 AUGUST 1986              *
                     00190 *                                       *
                     00200 *****************************************
          A000       00210 POLCAT  EQU $A000         *ROM ROUTINE TO POLE KEYBOARD
          A002       00220 CHROUT  EQU $A002         *ROM ROUTINE TO SEND REG. A TO
                     00230                           *THE DEVICE IN 'DEVNUM' ($006F)
7B8C                 00240 RBUF    RMB 32            *RED DATA BUFFER
7BAC                 00250 GBUF    RMB 32            *GREEN DATA BUFFER
7BCC                 00260 BBUF    RMB 32            *BLUE DATA BUFFER
7BEC      00         00270 ODEV    FCB 0             *SET FOR ODD PIXEL, RESET FOR E
VEN
7BED      00         00280 SETFLG  FCB 0             *SET IF LAST BIT WAS SET
7BEE      00         00290 VALUE   FCB 0             *VARIOUS
7BEF      00         00300 ENLRG   FCB 0             *IF SET, ENLARG PICTURE
7BF0      00         00310 BIT     FCB 0             *CURRENT BIT (0-7)
7BF1      00         00320 BYTE    FCB 0             *CURRENT BYTE (0-31)
7BF2      0E00       00330 PAGEST  FDB $0E00         *GRAPHICS PAGE START
7BF4      2600       00340 PAGEND  FDB $2600         *GRAPHICS PAGE END
7BF6 86   12         00350 START   LDA #18           *SET PRINTER OUTPUT
7BF8 97   96         00360         STA <$96          *TO 2400 BAUD
7BFA 0F   6F         00370         CLR <$6F          *SCREEN OUTPUT
7BFC BD   A928       00380         JSR $A928         *CLEAR SCREEN
7BFF 8E   7EAF       00390 TPAGE   LDX #TITLE        *GET TITLE MESSAGE
7C02 BD   7E9D       00400         JSR PRINT         *PRINT IT
7C05 8E   04E0       00410 QUERY   LDX #$04E0        *SET CURSOR POSITION
7C08 9F   88         00420         STX <$88          *FOR ENLARGE QUERY
7C0A 8E   7F1E       00430         LDX #QUERY1       *GET MESSAGE
7C0D BD   7E9D       00440         JSR PRINT         *PRINT IT
7C10 BD   7EA8       00450         JSR GETKEY        *WAIT FOR A RESPONSE
7C13 81   59         00460         CMPA #'Y          *WAS IT 'Y'
7C15 26   0A         00470         BNE NO            *NO, BRANCH
7C17 B7   7BEF       00480         STA ENLRG         *YES, SET FLAG
7C1A 86   40         00490         LDA #64           *AND SEND 64 ROWS IN GRAFIX SET
 UP
7C1C B7   7FEA       00500         STA PTABLE+2      *TO PRINTER
7C1F 20   0C         00510         BRA QURY1         *BRANCH TO PMODE QUERY
7C21 81   4E         00520 NO      CMPA #'N          *WAS IT 'N'?
7C23 26   E0         00530         BNE QUERY         *NO, TRY AGAIN
7C25 86   20         00540         LDA #32           *YES, SEND 32 ROWS IN GRAFIX SE
T UP
7C27 B7   7FEA       00550         STA PTABLE+2      *TO PRINTER
7C2A 7F   7BEF       00560         CLR ENLRG         *RESET FLAG
7C2D 8E   04F0       00570 QURY1   LDX #$04F0        *SET CURSOR POSITION FOR PMODE
7C30 9F   88         00580         STX <$88          *QUERY.
7C32 8E   7F28       00590         LDX #QUERY2       *GET MESSAGE
7C35 BD   7E9D       00600         JSR PRINT         *PRINT IT
7C38 BD   7EA8       00610 GET2    JSR GETKEY        *WAIT FOR A RESPONSE
```

```
7C3B 81   33        00620          CMPA #'3         *WAS IT '3'?
7C3D 27   06        00630          BEQ PMOD3        *YES, DUMP A PMODE 3 SCREEN.
7C3F 81   34        00640          CMPA #'4         *WAS IT '4'?
7C41 26   F5        00650          BNE GET2         *NO, TRY AGAIN
7C43 20   6E        00660          BRA PMOD4        *YES, DUMP A PMODE 4 SCREEN.
                    00670 *
                    00680 *ROUTINE TO DUMP PMODE 3
                    00690 *COLOUR OUTPUT IS DETERMINED BY USER
                    00700 *CHOICE IN 'SETCLR'.
                    00710 *
7C45 BD   7DE3      00720 PMOD3    JSR SETCLR       *GET COLOUR CHOICES
7C48 17   0238      00730          LBSR CLEAR0      *CLEAR DATA BUFFERS
7C4B 7F   7BF1      00740          CLR BYTE         *CLEAR BYTE COUNT
7C4E 10BE 7BF2      00750          LDY PAGEST       *START OF GRAFIX SCREEN
7C52 A6   A0        00760 NEXTBT   LDA ,Y+          *GET NEXT BYTE OFF SCREEN
7C54 7F   7BF0      00770          CLR BIT          *CLEAR BIT COUNT
7C57 7F   7BEE      00780 ROLLIT   CLR VALUE        *CLEAR OUT 'VALUE'. WILL HOLD
                    00790                           *VALUE OF TWO BIT PIXEL
7C5A 48             00800          LSLA             *SHIFT FIRST BIT OFF A INTO CAR
RY
7C5B 79   7BEE      00810          ROL VALUE        *ROLL IT INTO 'VALUE'
7C5E 48             00820          LSLA             *SHIFT THE SECOND
7C5F 79   7BEE      00830          ROL VALUE        *ROLL INTO 'VALUE'
7C62 8D   2E        00840          BSR COLOUR       *GO SET CORRESPONDING COLOUR
7C64 7C   7BF0      00850          INC BIT          *ADD 1 TO BIT COUNT
7C67 F6   7BF0      00860          LDB BIT          *CHECK COUNT
7C6A C1   08        00870          CMPB #8          *LAST FOR THIS BYTE?
7C6C 25   E9        00880          BLO ROLLIT       *NO, LOOP TO ROLL AGAIN
```

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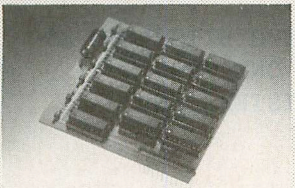

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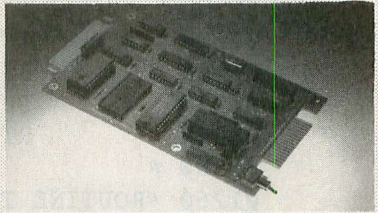

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```
7C6E 7C    7BF1    00890          INC BYTE       *YES, ADD 1 TO BYTE COUNT
7C71 F6    7BF1    00900          LDB BYTE       *CHECK COUNT
7C74 C1    20      00910          CMPB #$20      *LAST BYTE IN ROW?
7C76 25    DA      00920          BLO NEXTBT     *NO, GET NEXT BYTE
7C78 7F    7BF1    00930          CLR BYTE       *YES, CLEAR  BYTE COUNT
7C7B 7D    7BEF    00940          TST ENLRG      *TEST FOR LARGE PICTURE
7C7E 27    03      00950          BEQ WUNS       *IF NOT, SEND BUFFER ONCE
7C80 17    01AB    00960          LBSR DUMP0     *OTHERWISE SEND IT TWICE
7C83 17    01A8    00970 WUNS     LBSR DUMP0     *
7C86 17    01FA    00980          LBSR CLEAR0    *CLEAR DATA BUFFERS
7C89 10BC 7BF4     00990          CMPY PAGEND    *END OF SCREEN?
7C8D 25    C3      01000          BLO NEXTBT     *NO, GET NEXT BYTE.
7C8F 16    FF64    01010          LBRA START     *YES, RESTART.
                   01020 *
                   01030 *ROUTINE TO SET PROPER
                   01040 *COLOUR FROM 'VALUE' BASED
                   01050 *ON SELECTION TABLE.
                   01060 *
7C92 34    22      01070 COLOUR   PSHS Y,A       *SAVE REGISTERS
7C94 F6    7BEE    01080          LDB VALUE      *GET PIXEL VALUE (0-3)
7C97 8E    7FEC    01090          LDX #CTABLE    *GET SELECTION TABLE ADDRESS
7C9A 3A            01100          ABX            *ADD B'S OFFSET INTO IT
7C9B E6    84      01110          LDB ,X         *GET COLOUR NUMBER SELECTED
7C9D 8E    7FF0    01120          LDX #JTABLE    *POINT TO JUMP TABLE
7CA0 86    02      01130          LDA #2         *EACH ADDRESS IN TABLE
                   01140                         *IS TWO BYTES LONG.
7CA2 3D            01150          MUL            *MULTIPLY COLOUR # BY 2.
7CA3 3A            01160          ABX            *ADD THAT OFFSET INTO X.
7CA4 1F    12      01170          TFR X,Y        *X POINTS INDIRECTLY TO COLOUR
ROUTINE.
                   01180                         *SO PUT IT IN Y AND
7CA6 17    00E8    01190          LBSR SETX      *GO POINT X TO BUFFER BYTE
7CA9 AD    B4      01200          JSR [,Y]       *JUMP INDIRECTLY TO SET COLOUR.

7CAB 7C    7BF0    01210          INC BIT        *PIXELS ARE TWO BITS LONG SO
7CAE AD    B4      01220          JSR [,Y]       *DO THE NEXT ONE TOO.
7CB0 35    22      01230          PULS Y,A       *RECOVER REGISTERS AND
7CB2 39            01240          RTS            *RETURN.
                   01250 *
                   01260 *ROUTINE TO DUMP PMODE 4
                   01270 *WITH PSEUDO COLOURS.
                   01280 *
7CB3 8D    7C      01290 PMOD4    BSR PSEUDO     *SELECT EVEN OR ODD PIXELS RED
7CB5 17    01CB    01300          LBSR CLEAR0    *CLEAR BUFFERS
7CB8 7F    7BEC    01310          CLR ODEV       *RESET ODD/EVEN FLAG
7CBB 7F    7BED    01320          CLR SETFLG     *RESET LAST BIT FLAG
7CBE 7F    7BF1    01330          CLR BYTE       *CLEAR BYTE COUNTER
7CC1 10BE 7BF2     01340          LDY PAGEST     *START OF GRAFIX PAGE
7CC5 A6    A0      01350 NXTBYT   LDA ,Y+        *GET NEXT BYTE OFF SCREEN
7CC7 7F    7BF0    01360          CLR BIT        *CLEAR BIT COUNTER
7CCA 49            01370 ROLBIT   ROLA           *ROLL BIT OFF A INTO CARRY
7CCB 25    0B      01380          BCS NEXT       *BRANCH IF BIT WAS SET
7CCD 17    00C1    01390          LBSR SETX      *OTHERWISE POINT X INTO BUFFER
7CD0       BD      01400          FCB $BD        *OP CODE FOR 'JSR'
7CD1       0000    01410 MODIF1   FDB $0000      *ADDRESS OF BLACK/WHITE ROUTINE

7CD3 7F    7BED    01420          CLR SETFLG     *CLEAR BIT FLAG
```

```
7CD6 20   23        01430          BRA LOOP        *GO FINISH PASS
7CD8 7D   7BED      01440 NEXT     TST SETFLG      *TEST LAST BIT FLAG
7CDB 27   08        01450          BEQ NEXT1       *BRANCH IF BIT WAS ZERO
7CDD 17   00B1      01460          LBSR SETX       *OTHERWISE GO POINT X INTO BUFF
ER
7CE0      BD        01470          FCB $BD         *OP CODE FOR 'JSR'
7CE1      0000      01480 MODIF2   FDB $0000       *ADDRESS OF BLACK/WHITE ROUTINE

7CE3 20   16        01490          BRA LOOP        *FINISH PASS
7CE5 7C   7BED      01500 NEXT1    INC SETFLG      *BIT WAS SET, SO SET THE FLAG
7CE8 7D   7BEC      01510          TST ODEV        *TEST FOR ODD OR EVEN PIXEL
7CEB 27   08        01520 MODIFY   BEQ NEXT2       *BRACH IF EVEN (RESET)
7CED 17   00A1      01530          LBSR SETX       *OTHERWISE POINT X INTO BUFFER
7CF0 17   00EB      01540          LBSR VIOLET     *AND SET BIT TO VIOLET
7CF3 20   06        01550          BRA LOOP        *FINISH PASS
7CF5 17   0099      01560 NEXT2    LBSR SETX       *GO POINT X INTO BUFFER
7CF8 17   00B7      01570          LBSR RED        *AND SET BIT TO RED.
7CFB F6   7BEC      01580 LOOP     LDB ODEV        *TOGGLE ODD/EVEN FLAG
7CFE C8   01        01590          EORB #1         *
7D00 F7   7BEC      01600          STB ODEV        *
7D03 7C   7BF0      01610          INC BIT         *ADD 1 TO BIT COUNT
7D06 F6   7BF0      01620          LDB BIT         *CHECK COUNT
7D09 C1   08        01630          CMPB #8         *ARE WE FINISHED?
7D0B 25   BD        01640          BLO ROLBIT      *NO, GO ROLL ANOTHER BIT
7D0D 7C   7BF1      01650          INC BYTE        *YES, ADD 1 TO BYTE COUNT
7D10 F6   7BF1      01660          LDB BYTE        *CHECK COUNT
7D13 C1   20        01670          CMPB #$20       *ARE WE DONE WITH THIS LINE?
7D15 25   AE        01680          BLO NXTBYT      *NO, GO GET ANOTHER BYTE
7D17 7F   7BF1      01690          CLR BYTE        *YES, CLEAR BYTE COUNT
7D1A 7D   7BEF      01700          TST ENLRG       *SENDING A LARGE PICTURE?
7D1D 27   03        01710          BEQ ONCE        *NO, SEND DATA ONCE
7D1F 17   010C      01720          LBSR DUMP0      *OTHERWISE SEND IT TWICE
7D22 17   0109      01730 ONCE     LBSR DUMP0      *
7D25 17   015B      01740          LBSR CLEAR0     *SEND DATA BUFFER
7D28 10BC 7BF4      01750          CMPY PAGEND     *DONE WITH SCREEN?
7D2C 25   97        01760          BLO NXTBYT      *NO, GO GET NEXT BYTE
7D2E 16   FEC5      01770          LBRA START      *YES, RESTART PROGRAMME.
                    01780 *
                    01790 *ROUTINE TO SELECT PSEUDO
                    01800 *COLOUR OUTPUT.
                    01810 *
7D31 8E   04E0      01820 PSEUDO   LDX #$04E0      *CLEAR FROM X
7D34 CC   6060      01830          LDD #$6060      *TO BOTTOM OF SCREEN
7D37 ED   81        01840 PSEUD1   STD ,X++
7D39 8C   0600      01850          CMPX #$0600
7D3C 25   F9        01860          BLO PSEUD1
7D3E 8E   0500      01870          LDX #$0500      *POINT X TO PSEUDO COLOUR MESSA
GE
7D41 9F   88        01880          STX <$88
7D43 8E   7FB2      01890          LDX #PMESS      *POINT X TO MESSAGE
7D46 BD   7E9D      01900          JSR PRINT       *PRINT IT
7D49 BD   7EA8      01910 PSEUD2   JSR GETKEY      *GET RESPONSE
7D4C 81   45        01920          CMPA #'E        *WAS IT AN 'E'?
7D4E 27   0B        01930          BEQ PSEUD3      *BRANCH IF YES
7D50 81   4F        01940          CMPA #'O        *WAS IT AN 'O'?
7D52 26   F5        01950          BNE PSEUD2      *NO, TRY AGAIN
7D54 86   26        01960          LDA #$26        *YES, OP CODE FOR 'BNE'
```

```
7D56 B7    7CEB        01970          STA MODIFY        *
7D59 20    05          01980          BRA PSOUT         *BRANCH OUT
7D5B 86    27          01990 PSEUD3   LDA #$27          *'BEQ' OP CODE
7D5D B7    7CEB        02000          STA MODIFY        *
7D60 8E    0520        02010 PSOUT    LDX #$520         *POINT X TO SCREEN POSITION
7D63 9F    88          02020          STX <$88          *FOR BLACK/WHITE QUERY
7D65 8E    7FC7        02030          LDX #BLKWHT       *GET MESSAGE ADDRESS
7D68 BD    7E9D        02040          JSR PRINT         *PRINT IT
7D6B BD    7EA8        02050 CHKKEY   JSR GETKEY        *WAIT FOR RESPONSE
7D6E 81    42          02060          CMPA #'B          *IS IT 'B'LACK?
7D70 26    0E          02070          BNE CHKWHT        *NO, CHECK FOR 'W'
7D72 8E    7DAA        02080          LDX #BLACK        *YES, GET BLACK ROUTINE ADDRESS

7D75 BF    7CE1        02090          STX MODIF2        *MODIFY JUMP OPERAND
7D78 8E    7DAB        02100          LDX #WHITE        *GET WHITE ROUTINE ADDRESS
7D7B BF    7CD1        02110          STX MODIF1        *MODIFY OTHER JUMP OPERAND
7D7E 20    10          02120          BRA PSOUT2        *BRANCH OUT
7D80 81    57          02130 CHKWHT   CMPA #'W          *IS IT 'W'HITE?
7D82 26    E7          02140          BNE CHKKEY        *NO, TRY AGAIN
7D84 8E    7DAB        02150          LDX #WHITE        *YES, GET WHITE ROUTINE ADDRESS

7D87 BF    7CE1        02160          STX MODIF2        *MODIFY JUMP OPERAND
7D8A 8E    7DAA        02170          LDX #BLACK        *GET BLACK ROUTINE ADDRESS
7D8D BF    7CD1        02180          STX MODIF1        *MODIFY OTHER JUMP OPERAND
7D90 39                02190 PSOUT2   RTS
                       02200 *
                       02210 *ROUTINE TO POINT X INTO
                       02220 *GRAFIX DATA BUFFER
                       02230 *
7D91 8E    7B8C        02240 SETX     LDX #RBUF         *X AT BEGINNING OF BUFFER
7D94 F6    7BF1        02250          LDB BYTE          *GET BYTE COUNT OFFSET
7D97 3A                02260          ABX               *ADD OFFSET IN
7D98 39                02270          RTS               *AND RETURN
                       02280 *
                       02290 *ROUTINE TO CALCULATE THE
                       02300 *POWERS OF 2 FROM BIT COUNT
                       02310 *
7D99 C6    80          02320 POWERS   LDB #128          *START 'VALUE' AT 2^7
7D9B F7    7BEE        02330          STB VALUE         *AND GET
7D9E F6    7BF0        02340          LDB BIT           *THE BIT COUNT
7DA1 27    06          02350 POLOOP   BEQ POWOUT        *IF ZERO, BRANCH OUT
7DA3 74    7BEE        02360          LSR VALUE         *SHIFT POWER RIGHT
7DA6 5A                02370          DECB              *DECREMENT COUNT
7DA7 20    F8          02380          BRA POLOOP        *BRANCH THROUGH LOOP
7DA9 39                02390 POWOUT   RTS               *RETURN
                       02400 *
                       02410 *SET BIT TO PRINT BLACK
                       02420 *
7DAA 39                02430 BLACK    RTS               *Does naught.  Kept for uniform
ity
                       02440 *
                       02450 *SET BIT TO PRINT WHITE
                       02460 *
7DAB 8D    05          02470 WHITE    BSR RED
7DAD 8D    0D          02480          BSR GREEN
7DAF 8D    17          02490          BSR BLUE
7DB1 39                02500          RTS
```

```
                   02510 *
                   02520 *SET BIT TO PRINT RED
                   02530 *
7DB2 8D    E5      02540 RED      BSR POWERS
7DB4 E6    84      02550          LDB ,X
7DB6 FA    7BEE    02560          ORB VALUE
7DB9 E7    84      02570          STB ,X
7DBB 39            02580          RTS
                   02590 *
                   02600 *SET BIT TO PRINT GREEN
                   02610 *
7DBC 8D    DB      02620 GREEN    BSR POWERS
7DBE E6    88 20   02630          LDB 32,X
7DC1 FA    7BEE    02640          ORB VALUE
7DC4 E7    88 20   02650          STB 32,X
7DC7 39            02660          RTS
                   02670 *
                   02680 *SET BIT TO PRINT BLUE
                   02690 *
7DC8 8D    CF      02700 BLUE     BSR POWERS
7DCA E6    88 40   02710          LDB 64,X
7DCD FA    7BEE    02720          ORB VALUE
7DD0 E7    88 40   02730          STB 64,X
7DD3 39            02740          RTS
                   02750 *
                   02760 *SET BIT TO PRINT YELLOW
                   02770 *
7DD4 8D    DC      02780 YELLOW   BSR RED
7DD6 8D    E4      02790          BSR GREEN
7DD8 39            02800          RTS
                   02810 *
                   02820 *SET BIT TO PRINT MAGENTA
                   02830 *
7DD9 8D    D7      02840 MAGENT   BSR RED
7DDB 8D    EB      02850          BSR BLUE
7DDD 39            02860          RTS
                   02870 *
                   02880 *SET BIT TO PRINT VIOLET
                   02890 *
7DDE 8D    DC      02900 VIOLET   BSR GREEN
7DE0 8D    E6      02910          BSR BLUE
7DE2 39            02920          RTS
                   02930 *
                   02940 *CHOOSE 4-COLOUR-SET FROM
                   02950 *FROM 8 POSSIBLE PRINTER
                   02960 *COLOURS.
                   02970 *
7DE3 8E    04E0    02980 SETCLR   LDX #$04E0      *SET CURSOR PRINT POSITION
7DE6 CC    6060    02990          LDD #$6060      *CLEAR SCREEN FROM THERE
7DE9 ED    81      03000 CLS      STD ,X++        *
7DEB 8C    0600    03010          CMPX #$0600     *END OF SCREEN?
7DEE 25    F9      03020          BLO CLS         *NO, LOOP BACK
7DF0 8E    04E0    03030          LDX #$04E0      *YES, SET CURSOR POSITION
7DF3 9F    88      03040          STX <$88        *FOR COLOUR OPTIONS
7DF5 8E    7F30    03050          LDX #CMESS      *GET MESSAGE LOCATION
7DF8 BD    7E9D    03060          JSR PRINT       *PRINT IT
7DFB 8E    0580    03070          LDX #$0580      *SET CURSOR POSITION FOR
```

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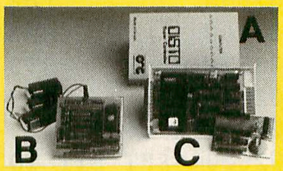

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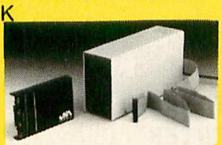

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WORD PROCESSOR • SPELLING CHECKER • PRINT SPOOLER

SCREEN DISPLAY OPTIONS

VIP Writer III has a screen of 32, 40, 64, or 80 characters wide by 24 lines using the CoCo 3's hardware display with actual lower case letters. You can choose fore and background colors from up to 64 different hues. Color can be turned ON or OFF for the best possible display using a color or monochrome monitor or TV set. VIP Writer III has a built in on-line context sensitive help facility which displays command usage in easy to read colored windows. VIP Writer III also runs at double clock speed!

TEXT FILE STORAGE

There is a 49K text buffer and disk or cassette file linking allowing virtually unlimited text space. In addition VIP Writer III is compatible with the RGB Computer Systems HARD DISK.

> *"...Nearly every feature and option possible to implement on the Color Computer. The design of the program is excellent; the programming is flawless."* **–The RAINBOW October 1983**

EDITING FEATURES

VIP Writer III has a full featured screen editor which can be used to edit text with lines up to 240 characters long with or without automatic word wrap around. You can select type-over mode or insert mode. There is even an OOPS command to recall a cleared text buffer. Other editing features include: Type-ahead, typamatic key repeat and key beep for flawless text entry, end of line bell, full four way cursor control with scrolling, top of textfile, bottom of textfile, page up, page down, top of screen, bottom of screen, beginning of line, end of line, left one word, right one word, DELETE character, to beginning or end of line, word to the left or right, or entire line, INSERT character or line, LOCATE and/or CHANGE or DELETE single or multiple occurrence using wildcards, BLOCK copy, move or delete with up to TEN simultaneous block manipulations, TAB key and programmable tab stops, three PROGRAMMABLE FUNCTIONS to perform tasks such as auto column creation and disk file linking for continuous printing.

TEXT FORMATTING

VIP Writer III automatically formats your text for you or allows you to format your text in any way you wish. You can change the top, bottom, left or right margin and page length. You can set your text flush left, center or flush right. You can turn right hand justification on or off. You can have headers, footers, page numbers and TWO auxiliary lines which can appear on odd, even or all pages. You can also select the line on which they appear! You can even change the line spacing! All of these parameters can be altered ANYWHERE within your text file.

TEXT FILE COMPATIBILITY

VIP Writer III creates ASCII text files which are compatible with all other VIP Programs as well as other programs which use ASCII file format. You can use VIP Writer III to create BASIC, assembly, PASCAL or C files. VIP Writer III also allows you to save and load files using DISK or CASSETTE in the case of an emergency. You can even read disk directories, display free space on a disk and rename or kill disk files.

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The VIP Writer III features a paper saving format window which allows you to preview your document BEFORE PRINTING IT! You are able to see centered text, margins, page breaks, orphan lines etc. This feature makes hyphenation a snap!

PRINTING

VIP Writer III supports most any printer serial or parallel using the parallel interface described in Nov-Dec. '87 RAINBOW magazine, or an external serial to parallel interface, and gives you the ability to select baud rates from 110 to 9600. You are able to imbed printer control codes anywhere in your text file EVEN WITHIN JUSTIFIED TEXT! VIP Writer III also has twenty PROGRAMMABLE PRINTER SEQUENCES which allow you to easily control all of your printers capabilities such as underline, bold, italics, superscript and subscript using simple keystrokes. Additional printer features include: single sheet pause, print pause, word length and line feed selection.

PRINT SPOOLING

VIP Writer III incorporates a built in print spooler with a 49,000 character buffer which allows you to print one document WHILE you are editing another. You no longer have to wait until your printer is done printing before starting another job!

DOCUMENTATION

VIP Writer III is supplied with a 125 page instruction manual which includes a tutorial, glossary of terms and a complete index. The manual is well written and includes many examples to aid in understanding and application. VIP Writer III includes VIP Speller at **NO ADDITIONAL COST.** **DISK $79.95**
Cassette version does not include VIP Speller. **TAPE $59.95**

VIP Writer owners: Upgrade to the VIP Writer III Disk for $49.95 or Tape for $39.95. Send original product. Include $3 shipping.

VIP WRITER - THE ORIGINAL

VIP Writer is also available for CoCo 1 and 2 owners and has all the features found in the VIP Writer III including VIP Speller except for the following: The screen display is 32, 51, 64 or 85 columns by 21 or 24 rows. Colors other than green, black or white are not supported. Help is not presented in colored windows. Double clock speed is not supported. Parallel printer interface is not supported. Print spooler is not available. Hard disk is not supported. Even so, the VIP Writer is a CoCo 1 or 2 owners best choice in word processors. VIP Writer includes VIP Speller at **NO ADDITIONAL COST.** **DISK $69.95**
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VIP Speller works with ANY ASCII file created by most popular word processors. It automatically checks text files for words to be corrected, marked for special attention or even added to the dictionary. You can even view the misspelled word in context! VIP Speller comes with a specially edited 50,000 word dictionary, and words can be added to or deleted from the dictionary or you can create one of your own. **DISK $34.95**

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```
7DFE 9F       88          03080             STX <$88             *COLOUR NUMBER QUERY
7E00 8E       7F93        03090             LDX #CMESS2          *GET MESSAGE LOCATION
7E03 BD       7E9D        03100             JSR PRINT            *PRINT IT
7E06 8E       05A0        03110             LDX #$05A0           *SET CURSOR POSITION FOR RESPON
SE
7E09 108E 7FEC            03120             LDY #CTABLE          *POINT Y INTO COLOUR TABLE
7E0D C6       70          03130             LDB #$70             *B HOLDS ASCII VALUE FOR '0'
7E0F E7       84          03140 AGAIN       STB ,X               *PRINT B ON SCREEN
7E11 86       7D          03150             LDA #$7D             *NOW PRINT AN
7E13 A7       01          03160             STA 1,X              *'=' ON THE SCREEN
7E15 BD       7EA8        03170 GETIT       JSR GETKEY           *GO AND WAIT FOR RESPONSE
7E18 80       30          03180             SUBA #$30            *NOW A SHOULD HAVE VALUE 0-3
7E1A 2B       F9          03190             BMI GETIT            *IF IT'S NEGATIVE, TRY AGAIN
7E1C 81       07          03200             CMPA #7              *IS IT >7?
7E1E 22       F5          03210             BHI GETIT            *YES, TRY AGAIN
7E20 A7       A0          03220             STA ,Y+              *OTHERWISE, STORE IT IN 'CTABLE
'
7E22 8B       70          03230             ADDA #$70            *ADD TO GET PROPER SCREEN CHARA
CTER
7E24 A7       02          03240             STA 2,X              *PRINT IT ON THE SCREEN
7E26 30       08          03250             LEAX 8,X             *MOVE X TO NEXT RESPONSE LOCATI
ON
7E28 5C                   03260             INCB                 *INCREMENT COUNTER
7E29 C1       74          03270             CMPB #$74            *IS IT LOWER THAN '4'?
7E2B 25       E2          03280             BLO AGAIN            *YES, GET NEXT RESPONSE
7E2D 39                   03290             RTS                  *NO, THEN RETURN
                          03300 *
                          03310 *DUMP BUFFERS TO PRINTER
                          03320 *
7E2E 8D       60          03330 DUMP0       BSR GRAFIX           *GO SEND CONTROL CODES TO PRINT
ER
7E30 8E       7B8C        03340             LDX #RBUF            *POINT X TO BEGINNING OF BUFFER

7E33 A6       80          03350 DUMP1       LDA ,X+              *GET NEXT BYTE
7E35 7D       7BEF        03360             TST ENLRG            *TEST FOR LARGE PICTURE
7E38 26       09          03370             BNE ENLARG           *YES, THEN ENLARGE DATA
7E3A BD       A2BF        03380             JSR $A2BF            *OTHERWISE SEND A TO PRINTER
7E3D 8C       7BEC        03390 BDUMP       CMPX #32+BBUF        *END OF BUFFERS?
7E40 25       F1          03400             BLO DUMP1            *NO, GET NEXT BYTE
7E42 39                   03410             RTS                  *YES, THEN RETURN
                          03420 *
                          03430 *ROUTINE TO ENLARGE DATA
                          03440 *EACH BIT IS EXPANDED
                          03450 *INTO TWO BITS.
                          03460 *
7E43 34       02          03470 ENLARG      PSHS A               *SAVE BYTE TO SEND
7E45 84       F0          03480             ANDA #240            *CLEAR RIGHT NIBBLE
7E47 85       10          03490             BITA #16             *TEST BIT 4
7E49 27       02          03500             BEQ T32              *BRANCH IF CLEAR
7E4B 88       13          03510             EORA #19             *SET BITS 0,1 RESET BIT 4
7E4D 85       20          03520 T32         BITA #32             TEST BIT 5
7E4F 27       02          03530             BEQ T64              *BRANCH IF CLEAR
7E51 88       2C          03540             EORA #44             *SET BITS 2,3 RESET BIT 5
7E53 85       40          03550 T64         BITA #64             *TEST BIT 6
7E55 27       02          03560             BEQ T128             *BRANCH IF CLEAR
7E57 88       70          03570             EORA #112            *SET BITS 4,5 RESET BIT 6
7E59 85       80          03580 T128        BITA #128            *TEST BIT 7
```

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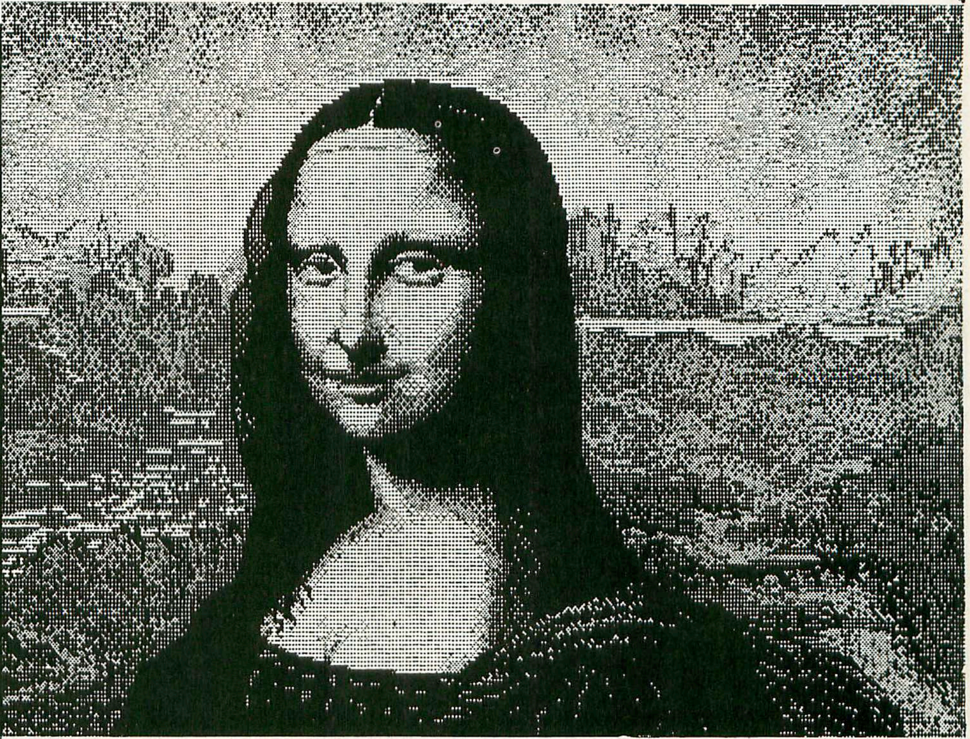

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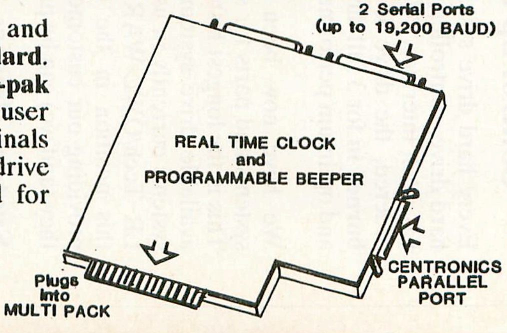

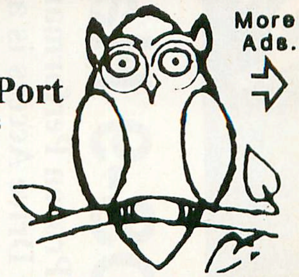

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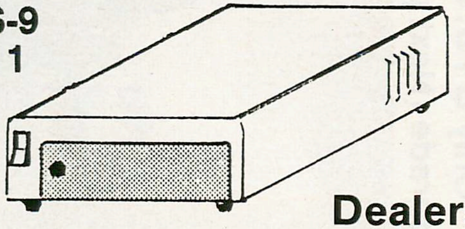

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```
7E5B 27   02       03590         BEQ ENLG2      *BRANCH IF CLEAR
7E5D 8A   C0       03600         ORA #192       *SET BITS 6,7
7E5F BD   A2BF     03610 ENLG2   JSR $A2BF      *SEND A TO PRINTER
7E62 35   02       03620         PULS A         *RECOVER ORIGINAL VALUE
7E64 84   0F       03630         ANDA #15       *CLEAR LEFT NIBBLE
7E66 85   08       03640         BITA #8        *TEST BIT 3
7E68 27   02       03650         BEQ T4         *BRANCH IF CLEAR
7E6A 88   C8       03660         EORA #200      *SET BITS 6,7 RESET BIT 3
7E6C 85   04       03670 T4      BITA #4        *TEST BIT 2
7E6E 27   02       03680         BEQ T2         *BRANCH IF CLEAR
7E70 88   34       03690         EORA #52       *SET BITS 4,5 RESET BIT 2
7E72 85   02       03700 T2      BITA #2        *TEST BIT 1
7E74 27   02       03710         BEQ T1         *BRANCH IF CLEAR
7E76 88   0E       03720         EORA #14       *SET BITS 2,3 RESET BIT 1
7E78 85   01       03730 T1      BITA #1        *TEST BIT 0
7E7A 27   02       03740         BEQ ENLG3      *BRANCH IF CLEAR
7E7C 8A   03       03750         ORA #3         *SET BITS 0,1
7E7E BD   A2BF     03760 ENLG3   JSR $A2BF      *SEND A TO PRINTER
7E81 20   BA       03770         BRA BDUMP
                   03780 *
                   03790 *ROUTINE TO CLEAR BUFFERS
                   03800 *
7E83 8E   7B8C     03810 CLEAR0  LDX #RBUF      *POINT X TO START OF BUFFER
7E86 4F            03820         CLRA           *CLEAR OUT
7E87 5F            03830         CLRB           *REGISTER D
7E88 ED   81       03840 CLEAR   STD ,X++       *CLEAR TWO BYTES IN BUFFER
7E8A 8C   7BEC     03850         CMPX #32+BBUF  *ARE WE DONE?
7E8D 25   F9       03860         BLO CLEAR      *NO, LOOP BACK
7E8F 39            03870         RTS            *YES, THEN RETURN
                   03880 *
                   03890 *ROUTINE TO SEND GRAFICS SETUP TO PRINTER
                   03900 *
7E90 8E   7FE8     03910 GRAFIX  LDX #PTABLE    *POINT X TO CODE TABLE
7E93 A6   80       03920 GRLOOP  LDA ,X+        *GET NEXT BYTE
7E95 27   05       03930         BEQ GRFOUT     *IF IT'S ZERO THEN BRANCH OUT
7E97 BD   A2BF     03940         JSR $A2BF      *OTHERWISE SEND A TO PRINTER
7E9A 20   F7       03950         BRA GRLOOP     *AND LOOP BACK
7E9C 39            03960 GRFOUT  RTS            *RETURN
                   03970 *
                   03980 *ROUTINE TO PRINT A MESSAGE
                   03990 *POINTED TO BY X.
                   04000 *
7E9D A6   80       04010 PRINT   LDA ,X+        *GET NEXT CHARACTER
7E9F 27   06       04020         BEQ POUT       *IF IT'S ZERO, BRANCH OUT
7EA1 AD   9F A002  04030         JSR [CHROUT]   *SEND TO SCREEN
7EA5 20   F6       04040         BRA PRINT      *LOOP BACK
7EA7 39            04050 POUT    RTS            *RETURN
                   04060 *
                   04070 *GET RESPONSE FROM KEYBOARD
                   04080 *
7EA8 AD   9F A000  04090 GETKEY  JSR [POLCAT]   *GO GET A KEY PRESS
7EAC 27   FA       04100         BEQ GETKEY     *IF NONE PRESSED, LOOP.
7EAE 39            04110         RTS            *RETURN
                   04120 *
7EAF      20       04130 TITLE   FCC /    T L S   S O F T W A R E/
7ECB      0D0D     04140         FDB $0D0D
7ECD      20       04150         FCC /    P R E S E N T S/
```

```
7EE8      0D0D      04160           FDB $0D0D
7EEA      20        04170           FCC /           IMAGE  V1.3/
7EFF      0D        04180           FCB $0D
7F00      20        04190           FCC /  FOR THE RADIO SHACK CGP-220/
7F1D      00        04200           FCB 0
7F1E      45        04210 QUERY1    FCC /ENLARGE ?/
7F27      00        04220           FCB 0
7F28      50        04230 QUERY2    FCC /PMODE ?/
7F2F      00        04240           FCB 0
7F30      20        04250 CMESS     FCC /    0=BLACK     4=BLUE/
7F46      0D        04260           FCB $0D
7F47      20        04270           FCC /    1=WHITE     5=YELLOW/
7F5F      0D        04280           FCB $0D
7F60      20        04290           FCC /    2=RED       6=VIOLET/
7F78      0D        04300           FCB $0D
7F79      20        04310           FCC /    3=GREEN     7=MAGENTA/
7F92      00        04320           FCB 0
7F93      54        04330 CMESS2    FCC /TYPE COLOUR # FOR SCREEN VALUE/
7FB1      00        04340           FCB 0
7FB2      65        04350 PMESS     FCC /eVEN RED OR oDD RED?/
7FC6      00        04360           FCB 0
7FC7      50        04370 BLKWHT    FCC /PRINT SET BITS AS bLACK OR wHITE/
7FE7      00        04380           FCB 0
7FE8      1B43      04390 PTABLE    FDB $1B43       *VALUES TO SET PRINTER
7FEA      2000      04400           FDB $2000       *TO COLOR-SCAN MODE
7FEC      00        04410 CTABLE    FCB 0           *VALUES 0-7 CORRESPONDING TO
7FED      01        04420           FCB 1           *INK COLOURS IN 'JTABLE'
7FEE      02        04430           FCB 2           *THESE ARE INDIRECT JUMPS TO TH
E
7FEF      03        04440           FCB 3           *COLOUR ROUTINES ABOVE
7FF0      7DAA      04450 JTABLE    FDB BLACK
7FF2      7DAB      04460           FDB WHITE
7FF4      7DB2      04470           FDB RED
7FF6      7DBC      04480           FDB GREEN
7FF8      7DC8      04490           FDB BLUE
7FFA      7DD4      04500           FDB YELLOW
7FFC      7DDE      04510           FDB VIOLET
7FFE      7DD9      04520           FDB MAGENT
          7BF6      04530           END START

00000 TOTAL ERRORS
```

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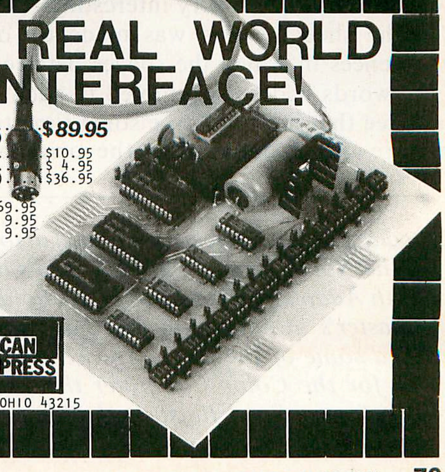

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Cany ou deco deth ismes sage?

Reading and Decoding Skills

By Fred B. Scerbo
Rainbow Contributing Editor

If you have an idea for the "Wishing Well," submit it to Fred c/o THE RAINBOW. *Remember, keep your ideas specific, and don't forget this is* BASIC. *All programs resulting from your wishes are for your use, but remain the property of the author.*

Sometimes a single sentence in a reader's letter can stimulate an idea for a whole program. Other times, ideas from several different sources synthesize into a single listing. It is really funny how ideas for programs are born.

For this month's program I must admit I felt a little at a loss. Just stop and think of how many programs appear in this column every year. I'm not complaining, mind you, but everyone runs into writer's block eventually. Most of the suggestions I have received in past months have not been practical, and I was hoping for something that would have great educational value. (Yes, I am working on a new game, but it's taking several months to put together.)

Then an idea came from the most unlikely of sources. During my 10-minute homeroom period, a new student came up to me with an assignment sheet he had been given in his science class. The worksheet had a list of sentences for him to decode.

Normally I am opposed to using things like word search puzzles because most of my students have a difficult time reading words forward, let alone backward and upside down. Too often, classroom assignments like these tend to be "time wasters." Still, there was something different about his assignment that made it very interesting.

The sheet he had was made up of sentences in which the spaces between the words had been jumbled to such a degree that it would take some time to figure out exactly what the original sentence was. The sentence looked sort of like this:

Pla ntsma kefo odb yph otosy nthes is.

When you first see this sentence, you might not understand what's going on. However, if you look closely, you can decode the letters into real words by rearranging the spaces. The sentence above, once decoded, reads: Plants make food by photosynthesis.

From this jumbled sentence came the idea for a whole new program, *Jumble*, to help youngsters learn while using the CoCo. The program would take a sentence and jumble it. The student would then "un-jumble" the sentence and reenter it into the computer. And users would also have the ability to supply their own sentences in `DATA` statements in order to create personalized software.

What are the advantages of such a program? Well, first of all, it provides the user with a new and exciting way to review educational material — it's almost like playing a game show. Secondly, a program like this helps to reinforce spelling skills. As I have mentioned in past columns, spelling is a difficult skill to reinforce on a computer. Some of my other programs have dealt with this skill directly; but, as a rule, most other programs are severely lacking in this area.

The Program

Devising the subroutines in *Jumble* to split up the sentences was actually quite easy. Each sentence from the `DATA` statements is measured for length using the `LEN` command. A `FOR-NEXT` loop counts through each character and deletes any spaces. Then another `FOR-NEXT` loop randomly inserts spaces back into this new spaceless string.

That was the easy part. Next came a tougher problem. It would not take too much effort simply to use the `INPUT` or `LINEINPUT` command to have the user type in a corrected sentence. However, the CoCo displays a 32-character screen on power-up, and the last thing I wanted was to have the user's text split up on the screen. What was needed was a routine that would let the screen appear to be like a word processor — a word-wrap routine.

This part took a little longer than I expected, but the final result was quite satisfying. Using the `INKEY$` command, I wrote a set of commands that allow you to type, backspace and enter just as you do on a word processor; words reaching the end of the screen jump down to the next line. The only thing you are not able to do is move the cursor over the type on the screen. You can only backspace to correct text.

The subroutine is not perfect, however. Because the program is written in BASIC, it does tend to get a little slower as the statement you type gets longer. If you type too fast, you might get ahead of the program. But this should not be too great a problem, as you will be going rather slowly when you try to decode each sentence. You might consider inserting a high-speed poke in the program, provided you have already saved the program to tape or disk. (Note: Be sure to remember that CoCo 1 and 2 can use `POKE65495,0` in most cases, while the CoCo 3 can use `POKE65497,0`. Some CoCos cannot use the high-speed poke when a disk controller is plugged in. When in doubt, leave it out.)

Let's say, for instance, that you want to try the sample sentences I have included in this listing. When the title card comes up on the screen, you may press I for Instructions or Q for Quiz. Many readers have recently requested

---

Fred Scerbo is a special needs instructor for the North Adams Public Schools in North Adams, Massachusetts. He holds a master's in education and has published some of the first software available for the Color Computer through his software firm, Illustrated Memory Banks.

that I include an Instructions option, so I figured this was as good a program as any to start with.

After reading the instructions or choosing the quiz, your quiz statements will be selected at random. At various times the screen will read, "Please stand by." This indicates that the program is creating a new jumbled sentence. Once the sentence appears, you may type your response at the bottom of the screen.

If at any point you want to check your progress, press the @ key; and you will be shown our standard score card. You may continue where you left off by pressing C. However, any typing you have done prior to that on a given statement will be lost and the sentence will be rejumbled. (Pressing C after the last problem may confuse the program and give you a blank sentence.)

You may rerun the program by pressing Y or end by pressing N. That really sums up the whole program. *Jumble* is not difficult to use, and it really can be lots of fun. You can actually have two students race to see who gets through all the sentences first, on two different CoCos. (I intentionally left out a timer option as different generations of CoCos run at different clock speeds, making uniform timing on different CoCos very difficult.)

Adding Your Own Sentences

You can dump my sentences by typing `DEL 1000-4999`. But the last line of the program must always be `5000 DATA END`.

You can add up to 50 sentences of your own by simply typing them into `DATA` statements starting in Line 1000. For uniformity, put each sentence in quotation marks — this prevents any problems with commas in your data. Here are samples you might try for younger CoCo users, as the data in my listing is a little bit tougher:

```
1000 DATA "TOM HAS A NEW HAT."
1010 DATA "SUE TIED HER SHOES."
1020 DATA "SEE TIGER JUMP."
```

You can make the sentences as simple or as complex as you like, and use the program with students from first grade through high school and beyond. The uses are really unlimited — foreign language statements, algebraic expressions or proofs, scientific notes, etc., are all possibilities. Be sure to save your new listings to tape or disk under different filenames. You can create a large library of customized educational software for your CoCo.

Many, Many Thanks!

Several months ago I suggested that anyone owning old, unused, dust-collecting CoCos could contact me if they wanted to donate them to a good cause. Since that time (which is actually only two weeks from the time of publication), several very kind people have donated valuable equipment to my special needs students for classroom use. My sincerest thanks go out to Fred Edwards, Paul French and David Brooks. Anyone who has sent equipment since will be acknowledged in future issues.

Once again I will mention that we can still use any old CoCos or disk drives. Anyone who wishes to make such a donation as a tax write-off may contact me at (413) 663-9648 after 9 p.m. (since it is still wrestling season for my team) or contact me at my home address or c/o Drury High School, South Church St., North Adams, MA 01247.

Again, thanks to all of you for your generosity. See you next month. ☐

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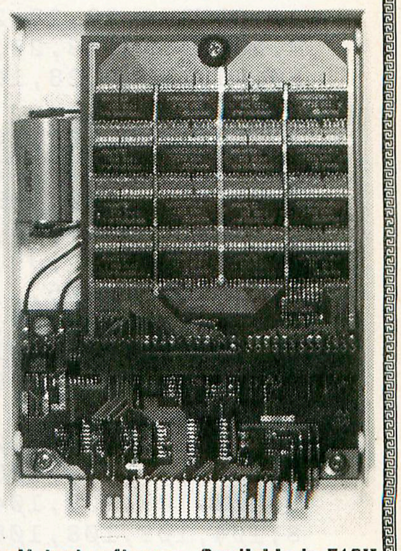

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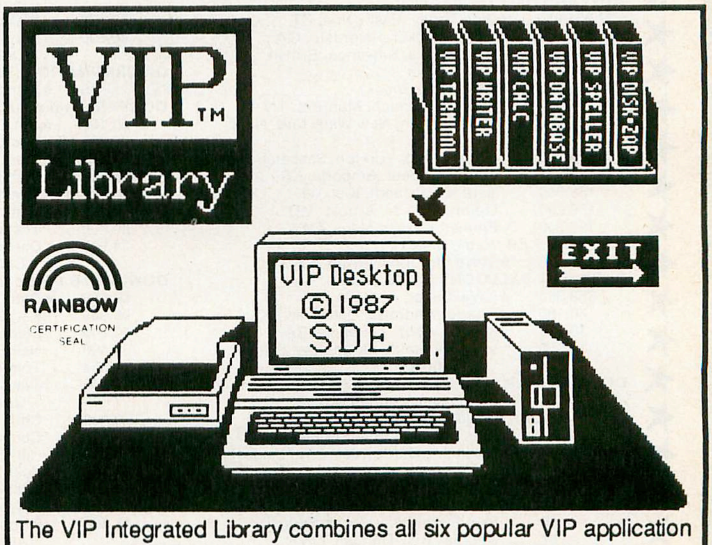
35 90
80 249
130 203
225 66
315 68
400 78
END 59

The listing: JUMBLE

```
1 REM ***********************
2 REM *   DECODING SKILLS    *
3 REM *  A DECODING GAME     *
4 REM *  BY FRED B.SCERBO    *
5 REM *   60 HARDING AVE.    *
6 REM * NORTH ADAMS,MA 01247 *
7 REM * COPYRIGHT (C) 1988   *
8 REM ***********************
9 CLEAR3000:CLS0:PRINTSTRING$(32
,188);STRING$(32,204);:FORI=1TO2
56:READA:PRINTCHR$(A+128);:NEXT
10 PRINTSTRING$(32,195);STRING$(
32,179);
15 DATA29,28,28,26,29,28,29,21,2
8,28,26,30,28,28,26,29,28,28,29,
20,29,28,21,31,18,16,29,24,30,28
,28,29
20 DATA21,,,26,21,19,18,21,,,,26
,,,26,21,,,21,,21,,16,26,29,18,2
1,,26,,19,19
25 DATA21,,,26,21,,17,21,,,18,26
,,,26,21,,,21,,21,,16,26,16,29,2
3,,26,,16,21
30 DATA28,28,28,24,28,28,28,20,2
8,28,24,28,28,28,24,28,28,28,28,
20,28,28,20,28,16,96,28,24,28,28
,28,28
35 DATA110,108,108,108,108,109,1
00,110,,97,110,,108,110,104,100,
109,108,,,100,109,108,,96,96,110
,108,108,108,108,109
40 DATA107,99,99,99,99,99,,107,9
9,110,96,,,106,,,101,,,,,101,,,,
,107,99,99,99,99,99
45 DATA98,,,,,101,,106,,109,98,,
96,106,,,101,,,,98,101,,,,98,98,
,,,,101
50 DATA108,108,108,108,108,108,1
00,104,,,108,,108,108,104,100,10
8,108,108,108,104,108,108,108,10
8,104,108,108,108,108,108,108
55 PRINT@419,"        BY FRED B.SCE
RBO       ";
60 PRINT@453,"  COPYRIGHT (C) 19
88  ";
65 PRINT@483," <I>NSTRUCTIONS OR
 <Q>UIZ ";
70 X$=INKEY$:XX=RND(-TIMER):IFX$
="I"THEN75ELSEIFX$="Q"THEN135ELS
E70
75 CLS:PRINT@34,"THIS PROGRAM IS
 DESIGNED TO        HELP YOU REVIEW
 IMPORTANT          INFORMATION IN
A FUN AND           EXCITING WAY.":
PRINT@194,"YOU WILL BE GIVEN A S
ENTENCE     WHICH HAS THE SPACES
IN IT       JUMBLED AROUND."
80 PRINT@322,"YOU MUST RE-TYPE T
HE SENTENCE      SO THAT IT IS CORR
ECT & MAKES      SENSE."
85 PRINT@450,"PRESS <ENTER> TO C
ONTINUE.";
90 IFINKEY$<>CHR$(13)THEN90
95 CLS:PRINT@34,"HERE IS AN EXAM
PLE OF SUCH         A SENTENCE:":PR
INT@130,"T HEC OWWA SST ANDING U
P."
100 PRINT@194,"YOU WOULD DECODE
THIS TO READ:":PRINT@258,"THE CO
W WAS STANDING UP."
105 PRINT@322,"PRESS <ENTER> WHE
N YOU THINK      THAT YOU HAVE THE
 SENTENCE         RIGHT."
110 PRINT@450,"PRESS <ENTER> TO
CONTINUE.";
115 IFINKEY$<>CHR$(13)THEN115
120 CLS:PRINT@34,"IF YOU DO NOT
GET THE ANSWER       CORRECT, YOU W
ILL BE GIVEN A       CHANCE TO TRY
IT AGAIN. YOU        MAY CHECK THE
SCORECARD BY         PRESSING THE <
@> KEY. YOU MAY      THEN RETURN TO
 THE PROGRAM BY      PRESSING <C> T
O CONTINUE"
125 PRINT@290,"BE SURE TO TYPE S
LOWLY!":PRINT@354,"PRESS <ENTER>
 TO BEGIN."
130 IFINKEY$<>CHR$(13)THEN130
135 CLS0
140 DIMAO(50),A$(50),B$(50),NP(5
0)
145 CLS0:GOTO180
150 D=0
155 IFLEN(J$)<=27THEN170
160 FORT=27TO0STEP-1:IFMID$(J$,T
,1)=" "THEN175
165 NEXT
170 W$=J$+C$:F=LEN(W$):PRINT@M+D
,W$;STRING$(X-F,32):RETURN
175 W$=LEFT$(J$,T):C$="":W$=W$+C
$:F=LEN(W$):PRINT@M+D,W$;STRING$
(X-F,32):C$=D$:J$=S$+RIGHT$(J$,(
LEN(J$))-T):D=D+32:GOTO155
180 FORJ=1TO50:READ A$(J):IFA$(J
)="END"THEN190
185 NEXTJ
190 CLS0:J=J-1
195 FORI=1TOJ
200 AO(I)=RND(J)
205 IFNP(AO(I))=1THEN 200
```

```
210 NP(AO(I))=1:NEXTI
215 FORP=1TOJ
220 CLS:PRINT@232,"PLEASE STAND
BY":A$="":B$="":R$="":C$="":D$="
":S$="    "
225 Q$=A$(AO(P)):K=LEN(Q$)
230 FORN=1TOK:IFMID$(Q$,N,1)=" "
THEN240
235 A$=A$+MID$(Q$,N,1)
240 NEXTN
245 K=LEN(Q$):B$=LEFT$(A$,3):FOR
N=4TOK
250 R=RND(12):IFR>4THEN260
255 B$=B$+" "
260 B$=B$+MID$(A$,N,1):NEXTN
265 CLS:PRINT@35,"DECODE STATEME
NT NO.";P:M=96::J$="    "+B$:X=31
:GOSUB150
270 M=289:PRINT@289,"=>"+CHR$(12
8);
275 X=29:C$=CHR$(128):D$=CHR$(12
8):S$="    "
280 Y$=INKEY$:IFY$="@"THEN345ELS
EIFY$=CHR$(13)THEN300ELSEIFY$=CH
R$(8)THEN290ELSEIFY$=""THEN280
285 R$=R$+Y$:J$="    "+R$:PRINT@29
1,"";:GOSUB150:PRINT:GOTO280
290 IFLEN(R$)<1THEN280
295 M=289:L=LEN(R$):R$=LEFT$(R$,
L-1):PRINT@M,"";:J$="    "+R$:GOSU
B150:PRINT:GOTO280
300 IFR$=Q$THEN305ELSE315
305 PRINT@480," YOU ARE ABSOLUT
ELY CORRECT!! ";
310 CR=CR+1:GOTO335
315 PRINT@480," SORRY, THAT IS
NOT CORRECT !";
320 IR=IR+1
325 X$=INKEY$:IFX$=CHR$(13)THEN3
30ELSEIFX$="@"THEN345ELSE325
330 PRINT@480,STRING$(30,32);:GO
TO280
335 X$=INKEY$:IFX$=CHR$(13)THEN3
40ELSEIFX$="@"THEN345ELSE335
340 NEXTP
345 CLS:PRINT@128,"";
350 L=CR+IR:IF L=0 THEN L=1
355 PRINT"    NUMBER CORRECT = "
CR
360 PRINT
365 PRINT"    NUMBER WRONG   = "
IR
370 PRINT:PRINT"    STUDENT SCOR
E  = ";INT(CR*100/L);"%"
375 PRINT:PRINT"    ANOTHER TRY
(Y/N/C)";
380 W$=INKEY$:IFW$=""THEN380
385 IF W$="Y" THEN RUN
390 IF W$="N" THEN CLS:END
395 IF W$="C" THEN 220
400 GOTO380
990 REM ENTER DATA AT LINE 1000
1000 DATA "FOOD IS AN ESSENTIAL
PART OF EVERYONE'S DAILY LIFE."
1010 DATA "WATER IS AN EVEN MORE
 IMPORTANT PART OF A PERSON'S DA
ILY INTAKE."
1020 DATA "YOU COULD GO FOR MORE
 DAYS WITHOUT FOOD THAN YOU COUL
D WITHOUT WATER."
1030 DATA "HUMANS ALSO NEED A CE
RTAIN AMOUNT OF SLEEP EACH DAY."
1040 DATA "THE HUMAN BODY MUST B
REAK DOWN FOOD BEFORE IT CAN BE
ABSORBED."
1050 DATA "MANY PEOPLE BELIEVE T
HAT ALL-NATURAL FOODS ARE BETTER
 FOR YOU."
1060 DATA "SOME PEOPLE GET VERY
UPSET WITH THE CHEMICALS THEY FI
ND IN THEIR FOOD."
1070 DATA "GOOD EATING HABITS US
UALLY LEAD TO GOOD HEALTH."
1080 DATA "TOO MUCH SUGAR IN YOU
R DIET IS NOT GOOD."
1090 DATA "FIBER IS AN IMPORTANT
 PART OF YOUR DIET, TOO."
5000 DATA END
```



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86	Roy Grant, Toledo, OH
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86	Paul Summers, Orange Park, FL
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89	Chris Piche, White Rock, British Columbia
89	Milan Parekh, Fullerton, CA
89	Andrew Urquhart, Metairie, LA
89	Steve Zemaitis, Howell, MI

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7,440	Wayne Hufford, Kincardine, Ontario
7,216	Martin Parada, Arcadia, CA

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43,806	★Domingo Martinez, Miami, FL
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31,673	Douglas Bacon, Middletown, CT
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25,739	John Weaver, Amsterdam, NY

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67,760	Jim Davis, Sandwich, IL
40,435	Upton Thomas, Arnold, MD
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16,995	Todd VanNatta, Isle of Palms, SC

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80,703	★Thomas Payton, Anderson, SC
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50,797	Patrick Devitt, Lombard, IL
26,125	Ryan Grady, Newbury Park, CA
24,355	Roby Janssen, Clear Lake, IA

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623,550	Dale Krueger, Maple Ridge, British Columbia
75,000	Blake Cadmus, Reading, PA
40,800	Benoit Landry, Drummondville, Quebec

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52,600	Eric Olson, Wheaton, IL

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1,276-0 •Jonathan Dorris, Indianapolis, IN
1,242-0 •William Currie, Bryans Road, MD
1,210-0 •Gregg Thompson, Chesterfield, VA
1,204-0 •Chad Johnson, Benton, AR
1,160-0 •Mark Lang, Downieville, CA
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3,200 Jeff Remick, Warren, IL
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303,100 Mike Grant, Fresno, CA
261,000 Domingo Martinez, Miami, FL
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213,300 Patrick Martel, Laval, Quebec
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1,201,383 Milan Parekh, Anaheim, CA
1,003,104 Elisa Goodson, Sao Paulo, Brazil
326,192 Martin Parada, Arcadia, CA
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148,932 Mike LeBrun, Cornwall, Ontario
RETURN OF JUNIOR'S REVENGE *(Colorware)*
1,792,800 ★Chad Presley, Luseland, Saskatchewan
RETURN OF THE JET-I *(ThunderVision)*
309,250 ★Melody Webb, Lakeport, CA
ROGUE *(Epyx)*
43,222 ★Hans Lutenegger, Madison, IA
27,542 Melanie Lapoint, Fitchburg, MA
21,682 Paul Blessing, Spring, TX
17,851 Yvan Langlois, Laval, Quebec
8,812 Allen Houk, San Diego, CA
SAILOR MAN *(Tom Mix)*
1,019,200 ★Gabriel Assel, Cameron, MO
341,800 Jason Clough, Houston, TX
332,600 Jeremy Carter, Spring Lake Park, MN
287,200 Patrick Devitt, Lombard, IL
SANDS OF EGYPT *(Radio Shack)*
67 ★Tristan Terkuc, Richmond, Ontario
82 Edward Rocha, Cobleskill, NY
86 Roy Grant, Toledo, OH
87 Neil Haupt, Elyria, OH
117 John Lente, Austin, TX
SAUCER DEFENSE *(THE RAINBOW, 4/87)*
4,000 ★Frankie DiGiovanni, Olney, MD
SHAMUS *(Radio Shack)*
16,410 ★Steve Stratton, Norfolk, VA
SHOOT'N RANGE (THE RAINBOW, 8/87)
13,794 ★Phillip Holsten, Modesto, CA
5,998 Richard Winkelbauer, Bronx, NY
5,433 Benoit Landry, Drummondville, Quebec
SPACE ASSAULT *(Radio Shack)*
13,110 ★Jeff Remick, Warren, MI
6,200 John Weaver, Amsterdam, NY
SPEED RACER *(MichTron)*
81,020 ★Wayne Hufford, Kincardine, Ontario
SPEEDSTER (THE RAINBOW 8/87)
32,110 ★Lisa Williamson, Watauga, TX
26,190 Melissa Clayton, Hoosick Falls, NY
22,750 Benoit Landry, Drummondville, Quebec
10,500 Sara Mittelstaedt, Kiel, WI
4,710 Andrea Reelitz, Greenville, IL
STRATEGY FOOTBALL (THE RAINBOW, 8/83)
153-0 ★Michael Heitz, Chicago, IL
STORM *(Computerware)*
113,315 ★Tony Bacon, Mt. Vernon, IN
69,645 Michael Bacon, Mt. Vernon, IN
SUCCESS MANSION (THE RAINBOW, 1/87)
13/13 ★Dave Allessi, Iselin, NJ
SUPER ROOTER (THE RAINBOW, 5/86)
15,180 ★Richard Donnell, Penns Grove, NJ
11,090 Frederick Lajoie, Nova Scotia, Canada
3,910 Daniel Bradford, Birmingham, AL
TEMPLE OF ROM *(Radio Shack)*
303,600 ★Tim Hennon, Highland, IN
138,400 Gary Budzak, Westerville, OH
125,200 Michelle Murray, Salem, IN
THEXDER *(Sierra On-Line)*
195,000 ★Emmett Keyser, Napa, CA
192,600 Frankie DiGiovanni, Olney, MD
TREASURE QUEST (THE RAINBOW, 11/86)
29,340 ★Matthew Smith, Courtenay, British Columbia
TREKBOER *(Mark Data)*
132 ★Matthew Fumich, Munford, TN
123 Roy Grant, Toledo, OH
TUT'S TUMB *(Mark Data)*
118,720 ★Reina Roy, Carleton, Quebec
74,780 Mack Haynes, Nice, CA
72,000 Chad Presley, Luseland, Saskatchewan
60,020 Don Siler, Muncie, IN
45,000 Blake Cadmus, Reading, PA
VARLOC *(Radio Shack)*
2,032 ★Tony Harbin, Cullman, AL
2,032 ★Edward Rocha, Cobleskill, NY
2,008 Philip Puffinburger, Winchester, VA
1,995 Denise Rowan, Minneapolis, MN
1,991 Ryan Grady, Newbury Park, CA
1,988 Randall Edwards, Dunlap, KS
1,975 Bernard Florence, Croydon, Australia
1,951 Gary Haggard, Cedar Hill, TX
VICIOUS VIC (THE RAINBOW, 7/86)
18,813 ★Talib Khan, Bronx, NY
11,902 Martha James, Swarthmore, PA
10,489 Karl Gulliford, Summerville, SC
6,294 Pat O'Neill, Nepean, Ontario
4,643 Martha James, Swarthmore, PA
3,285 Richard Donnell, Penns Grove, NJ
THE VORTEX FACTOR *(Mark Data)*
100/276 ★Tommy Crouser, Dunbar, WV
100/483 Rick & Brenda Stump, Laureldale, PA
210 Paul Maxwell, Vancouver, British Columbia
WARP FACTOR X *(Prickly-Pear)*
10,577,051 ★Doug Lute, Clymer, PA
WISHBRINGER *(Infocom)*
400/201 ★Brad Wilson, Lithia Springs, GA
WRESTLE MANIAC *(Diecom)*
956,971 ★Marc Reiter, Cincinnati, OH
546,315 Louis Bouchard, Gatineau, Quebec
45,483 Tony Bacon, Mt. Vernon, IN
42,105 David Brown, New Waterford, Nova Scotia
39,086 Billy Helmick, Independence, KY
ZAKSUND *(Elite Software)*
357,550 ★Martin Parada, Arcadia, CA
268,350 Tony Bacon, Mt. Vernon, IN
44,900 Michael Adams, Columbia, SC
39,950 Walter Hearne, Pensacola, FL
ZAXXON *(Datasoft)*
2,061,000 ★Byron Alford, Raytown, MO
1,950,000 Blake Cadmus, Reading, PA
1,300,500 Dan Brown, Pittsford, NY
1,100,600 Andrew Urquhart, Metairie, LA
253,400 Bob Dewitt, Blue Island, IL
170,600 Matthew Yarrows, East Hampton, MA
163,700 Daniel Bradford, Birmingham, AL
137,200 Upton Thomas, Arnold, MD
112,000 Ken Cikas, Sherman, IL
ZONERUNNER *(Radio Shack)*
65,535 ★Donald Cathcart, Halifax, Nova Scotia
ZONX (THE RAINBOW, 10/85)
6,500 ★Daniel Streidt, Cairo, Egypt
ZUES *(Aardvark)*
3,380 ★Martin Kertz, Forrest City, AR

— Jody Doyle

SCOREBOARD POINTERS

In conjunction with THE RAINBOW's Scoreboard, we offer this column of pointers for our game-playing readers' benefit. If you have some interesting hints, tips or responses to questions, or want help yourself, we encourage you to write to the Scoreboard, c/o THE RAINBOW.

Feedback

In response to questions from:

- Greg Fields: To get the scepter in *Sands of Egypt*, you must get the dates and feed them to the camel. Examine the carving on the statue and oil the scepter, then pull the scepter.

- Rick Moore: To get down the ladder in *Dallas Quest*, you must put all the items in the knapsack and type `DROP SACK`. After you drop the sack, get the flashlight and type `CLIMB LADDER`, `LIGHT LIGHT` and `DROP LIGHT`. After you drop the light, go back to the store and get your sack.

- Brian Hill: To get the torch in *Sands of Egypt*, first you go back to the base of the cliff and go south twice.

In *Sands of Egypt*, I cannot find a way to get the palm fronds. I also do not understand where I can find the ax. What is the ax used for?

In *Dallas Quest*, I am in the cave after you wave the ring to the cannibals. How do I get out?

In *White Fire of Eternity*, I am in the Shrine of Sorts. How do I get the pick? How do I open the box?

Mike Duvall
Zanesville, OH

- Robert Johnston: After you drug the first spider in *Trekboer* type `GET SPIDER`, then put the spider in the room where the plant is. Type `GET PLANT` and leave the room. Press the button; this should take care of the second spider.

- Phil Derksen: In *Planetfall*, to get the key, try using the bar. It's "magnetic."

How do you get past the stone gargoyle in *Raaka-Tu*? How do you get past the rug? Is there any way past the gates on the west wall? Are there any other secret passages other than under the altar? What do I do when I leave the secret passage under the altar?

Jim Price
Penetanguishene, Ontario

Scoreboard:

In *Dungeons of Daggorath*, the fastest way to get your shots in is to have your sword in your left hand. That way, you can put your left index finger on the A key, your right thumb on the space bar, your right index finger on the L key and your right middle finger on the ENTER key. Now you can "roll" your hands and fill the buffer up with "AL," short for "Attack Left." Once you have the ring on the first level, type `I FIRE` to get the power of it. Then save it for Level 2.

How do you get ice out of rime? What exactly is the strategy to get the wizard's image on level three and what do the Wraiths and Galdrogs sound and look like?

James Wilcox
Rockland, ME

Scoreboard:

I have killed the wizard's image in *Dungeons of Daggorath*, and after that I'm transported to the fourth level with the things I had in my hands and the torch I'm using. Everything else disappears. The wizard's image also leaves a scroll. How do I get all my stuff back and the scroll?

Mark Fernandez
N. Dartmouth, MA

Scoreboard:

In *Dungeons of Daggorath*, on Level 2, how do you kill the evil knight and how do you get to all six levels? Can you climb up the ladder or can you just climb down? How do you use the rings?

Mike Walter
Wilmington, NC

Scoreboard:

In *Sands of Egypt*, to get the magnifier you must go south from the bottom of the cliff and dig. How do I get the torch and the container? How do I get the palm fronds?

Joe Martinez
Pullman, WA

Scoreboard:

In *Dallas Quest*, to get by the natives, type `WAVE RING`. Once you've killed the spider, put the ring in the statue's eye and something will fall out of the statue's mouth.

In *Pyramid*, where is the sarcophagus? In *Shenanigans*, where is the pocket knife? In *Sands of Egypt*, where is the torch?

Jaan Laansoo
Barrie, Ontario

Scoreboard:

In *Dallas Quest*, how do you get past the dinghy boat and get on it? When you do get past it, what do you do?

In *One-On-One*, how do you shatter the backboard and get three points?

Stephen Wallis
Beverly, MA

Scoreboard:

In *Sea Quest*, supposedly you have to go east from the stairs, dig and get the mirror. But when I try to dig, it says, "With my hands? Surely you jest!"

In *Calixto Island*, when you get to a place with the tombstone and pagan idol, what do you do? What do you do when you get back to shore where the shack is?

In *Black Sanctum*, how do you know when the computer will all of a sudden take you to a strange place where your body feels paralyzed? What is the use of the woman's hair?

Timothy Bishop
Jacksonville, FL

Scoreboard:

In *Pyramid 2000*, water the plant and climb it. I read in "Scoreboard Pointers" that the scepter bridges a gap. Where is this gap? Where is the mummy's treasure chest?

In *Escape 2012*, how do you get out of the alien base and how do you build the bomb?

In *Sam Sleuth P.I.*, how do you solve the bank robbery?

Philip Manwarren
Harrington, ME

Scoreboard:

In *Pyramid 2000*, how do you give the little plant water?

In *Madness and the Minotaur*, how do you get the magic sword, spell book, truth or light ring?

Joe Szewczyk
Eagle River, WI

Scoreboard:

In *Robot Odyssey*, how do you get the ticket needed to get to the next level?

In *Wild West*, how do you dynamite without blowing yourself up?

In *Treasure of the Aztecs*, how do you get the rod out of the hut without getting speared?

In *Escape 2012*, how do you get past the guard droid?

Chad Presley
Luseland, Saskatchewan

Scoreboard:

To get past the bugblatter beast in *Hitchhiker's Guide to the Galaxy*, get the stone, put the towel on your head, carve Arthur Dent in the memorial and remove the towel.

In *Zork I*, the scepter will turn the rainbow into stairs.

In *Planetfall*, where is the radiation suit, and what do you do to the mural?

Ray Knoch
Lawson, MO

Scoreboard:

In *Hitchhiker's Guide to the Galaxy*, how do you kill the bugblatter beast of Traal, and how do you get past the screening door?

Richard Hawley
Honolulu, HI

Scoreboard:

In the *Interbank Incident*, I have found both keys, the rope, the computer, the disk, the cartridge, the transmitter and pipe, and the code book. But what do I do now?

Nick Rocco
Throop, PA

Scoreboard:

In *Vortex Factor*, how do I find the cartridge that takes me to London? How do I open the safe behind the calendar and how do I open the north doors? I have the red, yellow, pink and white cartridges.

Matt Buffalow
Walla Walla, WA

Scoreboard:

In *Raaka-Tu*, how do I get past the rug with the spiked pit?

Benoit St-Jean
Gatineau, Quebec

Scoreboard:

In *Raaka-Tu*, I cannot get by the gargoyle. I have found the coin, food, sword and the ring.

Troy Ferguson
Dease Lake, British Columbia

Scoreboard:

In *Madness and the Minotaur*, going south is the direction that almost always leads to the maze, but is not the only direction that leads to the maze.

In *Rogue*, don't drink two potions of Haste Self in succession because a flaw in the game will cause the computer to lock up and you'll lose your game.

In *The Magic of Zanth*, how do you open the bottle?

In *Raaka-Tu*, what do you do after you've killed the gargoyle and the snake and found the secret passage that leads back to the outside of the temple?

Steve Moore
Ontario, CA

Scoreboard:

In *Shenanigans*, to get to the clover field, you must go to where the unicorn horn is. Go east until you see "Obvious exits are: north, south, east, west." Type `EAST` and you will be in the clover field.

In *Sea Quest*, to find the last treasure, go where the deflated balloon is and go east. When you have all your treasures, go to your cave and drop them.

In *Raaka-Tu*, how do you get over the rug and where do you finish this Adventure?

Benoit St-Jean
Gatineau, Quebec

Scoreboard:

In *Shenanigans*, how do you get past the ravine in the cave?

Andrew Bryan
Springhill, Nova Scotia

Scoreboard:

In *Gates of Delirium*, how do I get to the Shrines and where can I find people to join my party? What's in the dungeons?

Dan Breault
Chicopee, MA

Scoreboard:

How do you get past Chamber 8 in *Downland* without getting killed on the rope at the top of the screen?

Jim Barkel
Zeeland, MI

Scoreboard:

I can't get into the tunnel in *Black Beard's Island*. I know that you go up to the cliff and type `MOVE SIGN` and it reveals a hidden tunnel, but how do you get into the tunnel?

Keith Janas
Kitwanga, British Columbia

Scoreboard:

After I deactivate the laser bars in *Escape 2012*, I cannot seem to get past the guard. I type `HELP`, but that doesn't work.

Will Patterson
Jacksonville, FL

Scoreboard:

In *Double Back*, to get the most amount of available points, let the moving objects, such as the magnets, move around the board until they build into one object. Then, circle them all at once. This will double the score for each object there.

Don Mullis
Delavan, WI

Scoreboard:

In *Gold Runner*, how do you get past Level 19? I have yet to find a way to collect the gold in the center block wall and then get out!

Monte Napper
Houston, TX

Scoreboard:

To all *Caladuril Flame of Light* players:

More thorough research into the chronicles scribed at the time of Jayen Tarinson and his adventures revealed two enigmatic verses apparently written by previous foes of Silmnoleh, Darker Lord of Fire.

The first pertains to "playces undergrounde," and reads as follows:

You're stuck at a door, too bad!
Your're stuck at a door, too right!
But don't you give up too soon,
There may be illusion, to right!

The second was found, we have discovered, scrawled on the wall of an iron castle:

Drop it near the dimmering depths.
You'll need it if you pass the steps.
But you can't take it when you go,
That wooden shield that aids you so.

Our own research has failed to reveal the meanings of these two verses; we publish them here in the hope they will aid other, braver Adventurers.

Jeff Noyle
Dave Triggerson
Georgetown, Ontario

To respond to other readers' inquiries and requests for assistance, reply to "Scoreboard Pointers," c/o THE RAINBOW, P.O. Box 385, Prospect, KY 40059. We will immediately forward your letter to the original respondent and, just as importantly, we'll share your reply with all "Scoreboard" readers in an upcoming issue.

For greater convenience, "Scoreboard Pointers" and requests for assistance may also be sent to us through the MAIL section of our Delphi CoCo SIG. From the CoCo SIG> prompt, pick MAIL, then type `SEND` and address to: `EDITORS`. Be sure to include your complete name and address.

Swamp Think

When you're bogged down in the CoCo marshes . . .

By Joseph Kolar
Rainbow Contributing Editor

Last month, we had a lot of fun with Lo-Res graphics borders. It was an enjoyable session. For an encore, I decided to continue our exploratory trip to see where this extended lesson would lead us.

From past experience, I know that the trail will peter out and we will get mired down in a CoCo swamp that has oodles of dead ends. The fun is in the journey and the computer flora and fauna that we check out along the way.

We pretended we were a bunch of CoConauts, beginning our safari through the tangle of BASIC jungle lore. Now that we are veteran bordermakers, load `MARQUEE1`, which last month you were invited to save.

The first idea perking away is of a double border. How to proceed? Start with a second row at the top. Type this line:

```
71 ´FOR H=2 TO 61 STEP2:SET
(H,2,C):NEXTH
```

Note the temporary masking `REM` (´).

Because a border exists around the perimeter of our screen (that is, two graphics units wide), instead of starting at `H=0`, we begin at `H=2`. Instead of ending at `H=62`, we allow for the right side border and stop at `H=61`. Since we used two vertical units, `0` and `1`, for the top row, we type `V=2`.

`H` has shrunk two units at each side and `V` is pushed down two units. By now, you must have a sneaking suspicion that each graphics square is really a 2-by-2 square. Run. It is evident that the lines we called forth display one colored space and one blank (black) space, racing around the perimeter. The other two spaces, on the second row, are also blank, creating the illusion of a solid, inner border.

As an aside, to fill the first two lines of the top border, we require a nested loop. Rekey Line 70 and run:

```
70 FOR H=0 TO 63:FOR V=0 TO
1:SET(H,V,8):NEXTV,H
```

The inner loop is gone through first, then the outer loop: `H=0,V=0;H=0,V=1;H=1,V=0:H=1;V=1 . . . H=63, V=0;H=63;V=1`. Run it again and watch it evolve. In the *next* part of the multiple-line statement, `V` is executed first. It is separated from `H`, the outer loop, by a comma. Rekey Line 70:

Florida-based Joseph Kolar is a veteran writer and programmer who specializes in introducing beginners to the powers of the Color Computer.

```
70 FOR H=0 TO 63:SET(H,0,8):
NEXTH:FOR V=0 TO 63:SET(H,
1,8):NEXTH
```

Run. Study it and you will see both orange lines become one husky one. Rekey Line 60 for a third way:

```
70 FORH=0TO63:SET(H,0,8):SET
(H,1,8):NEXTH
```

Run the program. To be honest, each method is as good as the next. Which system you select depends on the perspective you bring to CoColand.

Keep this information on tap. We don't want to pack it on at this stage of the journey. However, we may be looking for it later.

Restore the original Line 70:

```
70 FOR H=0TO63:STEP2:SET(H,
0,C):NEXTH
```

Edit Line 71 to get rid of the `REM` marker (´). Enter `EDIT 71`, press D (for Delete), then press ENTER. The line is now active! Run to see its effect.

Now, to get the inner, right side border segment doped out, we know that we can work on `H=61`, and the vertical column can begin at `V=2` and end at `V=29`. The `V` length has shrunk at both ends. Enter this line and run:

```
81 FOR V=2TO29STEP2:SET(61,
V,C):NEXTV
```

Compare the paired lines, lines 70 and 71 and 80 and 81. This should suggest what shape Line 91 should take:

```
91 FORH=61TO2 STEP-2:SET(H,
29,C+1):NEXTH
```

Run, and note that `C+1` was utilized to change colors.

At this point, create a suitable Line 101. Check listing `TRIPLE` for my version. Run.

My mind is intrigued with a third inner border. But, enough of two rows of colored light bulbs. I want the inner row to be a moving, colored neon tube.

Refer to `TRIPLE`, lines 72, 82, 92 and 102. Again, the `FOR` lines are compressed by two more units at each end. The other end decreases or increases by two, depending on the direction traveled. We are using `STEP-1` when the `FOR` value is decreasing as it is executed. It is omitted in the ascending `FOR` values because `STEP+1` (`STEP1`) is the default mode. If it makes more sense to you, be my guest, and include it in lines 72 and 82.

Key in the four lines and run.

A lot of jungle paths are tempting me. What about a `STEP-3` variant? How about an outside `STEP-1` border? How about a convoluted square working to the center of the screen? (Save `TRIPLE` now.)

Now convert the outer border, lines 70, 80, 90 and 100, so that they sandwich the light bulbs (middle row). Merely edit each of the four lines to `STEP1` or `STEP-1`. For example, enter `EDIT70` and press the space bar until the cursor is over the 2 of `STEP2`. Maybe we ought to make the third variable, denoting color, agree in the neon lines (`C` and `C` or `C+1` and `C+1`). Run.

This variant is OK, but it lacks pizazz. What if we checked the neon lines and made all `C+1` variables into `C` variables? Run when ready. This version doesn't do anything for me.

Try this: Rekey Line 65 as `65 FOR C=1 TO RND(8)` and run. This will run itself out and display a fairly well-balanced, colored border. Line 65 could be written like this and produce the same result: 65 FOR C=RND(1) to RND(8). Run the program.

Stop as you work along with me and save anything that suits your fancy. At this stage, I am changing Line 0 to 0 '<TRIPLEA> and making a copy before I get lost.

Another trail to explore is that of making the light bulb row circulate in the opposite, counterclockwise direction. This involves lines 71, 81, 91 and 101. The FOR part of the line must be reversed, STEP+2 changed to STEP-2, and STEP-2 changed to STEP+2.

Restore Line 65 as 65 FOR C=1TO8 and run. Something is wrong! Now add the "title line" 0 'WACKY and save the program as WACKY, if you like. Can you see where I wandered down the primrose path?

I had to camp out in this dismal swampland and work out proper lines 71, 81, 91 and 101: Merely change Line 81 to 101 and 101 to 81. Change C+1 to C in lines 81 and 91. All the color-set values will be the same. Line 66 should now be inoperative. Mask it and run to see if this is true. The program goes into a dizzying perpetual loop when it hits orange, Color 8. As it stands, the display is no earth-shatterer.

For variety, let's turn the outer border into a light bulb border. Change the four 1s to 2s in the STEP, lines 70, 80, 90 and 100. Run. This, too, poops out with an orange border.

Suppose the outer border were STEP-3 or +3? Try it! Run it! Give it a title line: 0 'WACKYA.

You can put these few programs into perpetual color recycling.

Edit Line 200 by entering EDIT200. Press X to jump to the end of the line, then backspace three characters. Type 65, press ENTER, and run. Easier still, rekey Line 200 as 200 GOTO 65 and run.

What if the light bulb (middle row) were changed to a neon sign and the inner one changed to a STEP 3 to complement the outside row?

First, change the four STEP2 or -2 commands in lines 71, 81, 91 and 101 to STEP+1 or -1, and run. That's not too bad — do you see how I am getting more and more ideas and am sidetracked from exploring other paths pregnant with possibilities?

Remember that routine with a double, solid orange row that we set aside as boring? What if we set the outer border to a nice wide band of living color?

Enter EDIT70 and press the space bar until the cursor is over the S in STEP. Type 5D (to delete STEP and the space), press I (for Insert) and type :FOR V=0TO1:. Press a shifted up arrow to get out of the Insert mode, and advance the space bar until the cursor is over the C. Press C (for Change) and replace the letter by pressing V. Then press the space bar until the cursor is over the final H. Press I, type V,, press ENTER and run.

Edit Line 80 by entering EDIT80. Advance the space bar until the cursor is over the S in STEP. Type 6D (to delete six characters) and press I (for Insert). Type :FOR H=62 to 63 and press a shifted up arrow to get out of the Insert mode. Advance the space bar until the cursor is over the 6 in 63. Press D (for Delete), C (for Change) and H, and advance the space bar until the cursor is over the final V. Press I, type H, press ENTER and run.

At this point, it begins to dawn on me that it might be wiser to execute the outer frame completely, then the middle frame and, finally, the inner frame.

I leave it to you to edit lines 90 and 100. This is designed to give you much-needed practice. Unmask Line 65 (remove the REM marker). Finally, change C to C+1 in lines 70, 80, 90 and 100. In the unlikely event that you get hung up, refer to listing WACKYB.

On one of my meandering treks, I modified TRIPLE. See TRIPLEA. This has two rows of light bulbs with an inner neon sign. Compare each *triplet* (lines 70 to 72, 80 to 82, etc.). Can you spot the camouflaged changes? Note that the numeral variable in the SET statement in lines 72 and 102 was a 5 instead of the expected 4; in Line 82, 58 instead of 59; and in Line 92, 26 instead of 27. This gives a colored (as opposed to black) inner border segment. Why is this so?

I am dead-ending in cul-de-sacs on all trails that intrigued me. However, I want to try to make a convoluted STEP2;STEP-2 border that ends up in the middle of the screen. I will start you off on this insane race to nowhere.

In listing TRIPLE1, delete some lines by typing the following: DEL71-72, DEL81-82, DEL91-92 and DEL101-102. Run.

Edit Line 100, advancing the space bar until the cursor is over the first 0. Press C, type 2, press ENTER, and run. Enter RENUM 400,110,10 to renumber the lines, and add these lines:

```
110 FOR H=2 TO 61 STEP2:SET
(H,2,C):NEXTH
120 FOR V=2 TO 29 STEP2:SET
(59,V,C):NEXTV
130 FOR H=59 TO 2 STEP-2:SET
(H,29,C):NEXTH
140 FOR V=27 TO 4 STEP-2:SET
(4,V,C):NEXTV
150 FOR H=4 TO 49 STEP2:SET
(H,4,C):NEXTH
```

. . . and so forth.

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See Us On DELPHI

If you want to see the imperfect program I created, key in SEASHELL. It has minor flaws; however, since we stumble over exposed roots now and then in our zealous explorations, we exhibit this prize spiral shell, flaws and all.

This is too bizarre for me. I checked all the lines from 70 to 370 and yanked out all the +1s from C+1 variables so that only one color would make its debut at a time. The central area is disturbing, due to the black area. Luckily, the ol' legend was intact. Add these lines and run:

```
251 NEXTC
252 GOTO65
```

Examine the specimen carefully and you will see that there are four light bulbs on the left side and five on the right, zipping around the legend.

Nothing can be satisfactorily adjusted in the rows five above and six below the light bulbs. To maintain the integrity of the three-line title, we must live with this sad state of affairs.

Can we support our legend by including Line 260 into CoCo's mindless race around the legend? We will never find out unless we try it.

Enter `LIST-270` and `DEL251-252` and `261 NEXTC:GOTO65` and run. Perfect! Now all that is required is to condense the three-text line legend one character-width, and thereby create a left green margin.

Enter `LIST-60`. Use the Edit mode to raise the TAB value by 1 in lines 30, 50 and 60. Run. Isn't that better? It is time to extract the three periods from the same lines. Do so, with Edit, and run.

Enter `EDIT 0` and advance the space bar two spaces. Press H (for Hack) to chop off the title, type RACE and press ENTER. Enter `LIST-70` to display the listing up to Line 70. Line 66 must go, as it isn't saying anything to CoCo. Enter `DEL66` and run. Save your modification as RACE.

Note that unnecessary lines, 270 out, were not deleted. It costs nothing to include them in your save — and, who knows, we may want them later. With similar logic, rather than delete unused lines, you could consider making them passive with a REM marker. For the newcomer, this may be somewhat confusing. But as you get more time behind the keyboard, you will use REM religiously.

There are many, many ideas to investigate, and you will want to continue to wade through the swamp of the unknown, seeking more variants. I can think of many more.

Each mind is unique. You must have made many discoveries if you put forth the effort last month to explore on your own. If you did, note that a lot of jungle trails and variants you discovered are unlike the ones I found lurking in the dark recesses of my mind. That is as it should be!

As it is, there are so many vine-strewn paths concealing fine variant programs, that you are urged to have RACE handy to continue our super-extended lesson in our next tutorial.

But, this is your day! Keep probing and you will add to your ever-increasing cache of knowledge and amuse yourself, to boot. And if you are running RACE, watch entranced as CoCo breathlessly scoots around the three-liner.

We have been bogged down in the very beginning of BASIC, using very few commands and statements. Even so, you have inspired me to create some neat graphics titles. I hope I have given you a slight push to explore more pathways. Consider how far we have advanced. Just last month we began by creating a blank PRINT line. You have progressed far, but not without setbacks. You have seen that we have barely cleared a small path in the Lo-Res part of BASIC. If we diligently pursue all of our ideas, will we ever get out of Color BASIC? So far, we have used only the EDIT command from Extended Color BASIC.

Next month, we will continue on our bogged-down swamp search. If you are confused with some facets of EDIT, refer to your manual, but rest assured that we shall provide more examples to give you lots of hands-on practice. Join me as we delve deeper into the swamp and seek out creative ideas. Even if we don't find the fountain of youth, we will have found a veritable fountain of valuable CoCo knowledge. □

Listing 1:

```
0 '<TRIPLE>
10 CLS
20 FOR X=1 TO 5:PRINT:NEXTX
30 PRINTTAB(9)"DOCHITA D. MAY"
40 PRINT
50 PRINTTAB(7)"510 HIGHLANDS AVE
."
60 PRINT:PRINTTAB(5)"INVERNESS,
FL., 32652"
65 FOR C=1 TO 8
66 IF C+1=9 THEN C=1
70 FOR H=0 TO 63STEP2:SET(H,0,C)
:NEXTH
71 FOR H=2 TO 61 STEP2:SET(H,2,C
+1):NEXTH
72 FOR H=4 TO 59:SET(H,4,C):NEXT
H
80 FOR V=0 TO 31STEP+2:SET(63,V,
C+1):NEXTV
81 FOR V=2 TO 29STEP2:SET(61,V,C
):NEXTV
82 FOR V=4 TO 27:SET(59,V,C):NEX
TV
90 FOR H=63 TO 0 STEP-2:SET(H,31
,C):NEXTH
91 FOR H=61 TO 2 STEP-2:SET(H,29
,C+1):NEXTH
92 FOR H=59 TO 4STEP-1:SET(H,27,
C):NEXTH
100 FOR V=31 TO 0 STEP-2:SET(0,V
,C+1):NEXTV
101 FOR V=29 TO 2 STEP-2:SET(2,V
,C):NEXTV
102 FOR V=27 TO 4STEP-1:SET(4,V,
C):NEXTV
110 NEXTC
200 GOTO200
```

Listing 2:

```
0 '<TRIPLEA>
10 CLS
20 FOR X=1 TO 5:PRINT:NEXTX
30 PRINTTAB(9)"DOCHITA D. MAY"
40 PRINT
```

```
50 PRINTTAB(7)"510 HIGHLANDS AVE
."
60 PRINT:PRINTTAB(5)"INVERNESS,
FL., 32652"
65 FOR C=RND(1) TO RND(8)
66 IF C+1=9 THEN C=1
70 FOR H=0 TO 63STEP1:SET(H,0,C)
:NEXTH
71 FOR H=2 TO 61 STEP2:SET(H,2,C
+1):NEXTH
72 FOR H=4 TO 59:SET(H,4,C):NEXT
H
80 FOR V=0 TO 31STEP+1:SET(63,V,
C):NEXTV
81 FOR V=2 TO 29STEP2:SET(61,V,C
):NEXTV
82 FOR V=4 TO 27:SET(59,V,C):NEX
TV
90 FOR H=63 TO 0 STEP-1:SET(H,31
,C):NEXTH
91 FOR H=61 TO 2 STEP-2:SET(H,29
,C+1):NEXTH
92 FOR H=59 TO 4STEP-1:SET(H,27,
C):NEXTH
100 FOR V=31 TO 0 STEP-1:SET(0,V
,C):NEXTV
101 FOR V=29 TO 2 STEP-2:SET(2,V
,C):NEXTV
102 FOR V=27 TO 4STEP-1:SET(4,V,
C):NEXTV
110 NEXTC
200 GOTO200
```

Listing 3:

```
0 '<WACKYA>
10 CLS
20 FOR X=1 TO 5:PRINT:NEXTX
30 PRINTTAB(9)"DOCHITA D. MAY"
40 PRINT
50 PRINTTAB(7)"510 HIGHLANDS AVE
."
60 PRINT:PRINTTAB(5)"INVERNESS,
FL., 32652"
65 FOR C=1 TO 8
66 'IF C+1=9 THEN C=1
70 FOR H=0 TO 63STEP3:SET(H,0,C)
:NEXTH
71 FOR H=61TO 2 STEP-2:SET(H,2,C
):NEXTH
72 FOR H=4 TO 59:SET(H,4,C):NEXT
H
80 FOR V=0 TO 31STEP+3:SET(63,V,
C):NEXTV
81 FOR V=2 TO 29 STEP+2:SET(2,V,
C):NEXTV
82 FOR V=4 TO 27:SET(59,V,C):NEX
TV
90 FOR H=63 TO 0 STEP-3:SET(H,31
,C):NEXTH
91 FOR H=2 TO 61 STEP+2:SET(H,29
,C):NEXTH
92 FOR H=59 TO 4STEP-1:SET(H,27,
C):NEXTH
100 FOR V=31 TO 0 STEP-3:SET(0,V
,C):NEXTV
101 FOR V=29 TO 2 STEP-2:SET(61,
V,C):NEXTV
102 FOR V=27 TO 4STEP-1:SET(4,V,
C):NEXTV
110 NEXTC
200 GOTO200
```

Listing 4:

```
0 '<WACKYB>
10 CLS
20 FOR X=1 TO 5:PRINT:NEXTX
30 PRINTTAB(9)"DOCHITA D. MAY"
40 PRINT
50 PRINTTAB(7)"510 HIGHLANDS AVE
."
60 PRINT:PRINTTAB(5)"INVERNESS,
FL., 32652"
65 FOR C=1 TO 8
66 IF C+1=9 THEN C=1
70 FOR H=0 TO 63:FORV=O TO 1::SE
T(H,V,C+1):NEXTV,H
71 FOR H=61TO 2 STEP-1:SET(H,2,C
):NEXTH
```

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```
72 FOR H=4 TO 59:SET(H,4,C):NEXT
H
80 FOR V=0 TO 31:FOR H=62 TO 63:
SET(H,V,C+1):NEXTH,V
81 FOR V=2 TO 29 STEP+1:SET(2,V,
C):NEXTV
82 FOR V=4 TO 27:SET(59,V,C):NEX
TV
90 FOR H=63 TO 0STEP-1:FORV=30 T
O 31:SET(H,V,C+1):NEXTV,H
91 FOR H=2 TO 61 STEP+1:SET(H,29
,C):NEXTH
92 FOR H=59 TO 4STEP-1:SET(H,27,
C):NEXTH
100 FOR H=0 TO 1:FOR V=31 TO 0 S
TEP-1:SET(H,V,C+1):NEXTV,H
101 FOR V=29 TO 2 STEP-1:SET(61,
V,C):NEXTV
102 FOR V=27 TO 4STEP-1:SET(4,V,
C):NEXTV
110 NEXTC
200 GOTO65
```

Listing 5:

```
0 '<SEASHELL>
10 CLS
20 FOR X=1 TO 5:PRINT:NEXTX
30 PRINTTAB(9)"DOCHITA D. MAY"
40 PRINT
50 PRINTTAB(7)"510 HIGHLANDS AVE
."
60 PRINT:PRINTTAB(5)"INVERNESS,
FL., 32652"
65 FOR C=1 TO 8
66 IF C+1=9 THEN C=1
70 FOR H=0 TO 63STEP2:SET(H,0,C)
:NEXTH
80 FOR V=0 TO 31STEP+2:SET(63,V,
C+1):NEXTV
90 FOR H=63 TO 0 STEP-2:SET(H,31
,C):NEXTH
100 FOR V=31 TO 2 STEP-2:SET(0,V
,C+1):NEXTV
110 FOR H=2 TO 61 STEP2:SET(H,2,
C):NEXTH
120 FOR V=2 TO 29 STEP2:SET(61,V
,C):NEXTV
130 FOR H=59 TO 2 STEP-2:SET(H,2
9,C):NEXTH
140 FOR V=27 TO 4 STEP-2:SET(2,V
,C+1):NEXTV
150 FOR H=4TO59 STEP2:SET(H,4,C)
:NEXTH
160 FOR V=4TO27 STEP2:SET(59,V,C
):NEXTV
170 FOR H=57 TO4STEP-2:SET(H,27,
C):NEXTH
180 FOR V=25 TO 6 STEP-2:SET(4,V
,C+1):NEXTV
190 FOR H=6TO57 STEP2:SET(H,6,C)
:NEXTH
200 FOR V=6TO25 STEP2:SET(57,V,C
):NEXTV
210 FOR H=55 TO 6 STEP-2:SET(H,2
5,C):NEXTH
220 FOR V=23 TO6 STEP-2:SET(6,V,
C+1):NEXTV
230 FOR H=8TO55STEP2:SET(H,8,C):
NEXTH
240 FOR V=8 TO23 STEP2:SET(55,V,
C):NEXTV
250 FOR H=53 TO8STEP-2:SET(H,23,
C):NEXTH
260 FOR V=21 TO 8STEP-2:SET(8,V,
C+1):NEXTV
270 FORH=10TO53STEP2:SET(H,10,C)
:NEXTH
280 FOR V=10 TO21STEP2:SET(53,V,
C):NEXTV
290 FOR H=51 TO10STEP-2:SET(H,21
,C):NEXTH
300 FOR V=19 TO 12STEP-2:SET(10,
V,C+1):NEXTV
310 FORH=12 TO51 STEP2:SET(H,12,
C):NEXTH
320 FOR V=12 TO19 STEP2:SET(51,V
,C):NEXTV
330 FORH=49 TO12 STEP-2:SET(H,19
,C):NEXTH
340 FOR V=17 TO14 STEP-2:SET(12,
V,C+1):NEXTV
350 FORH=14TO49STEP2:SET(H,14,C)
:NEXTH
360 SET(49,16,C)
370 FOR H=47 TO14STEP-2:SET(H,16
,C):NEXTH
400 NEXTC
410 GOTO410
```

Listing 6:

```
0 '<RACE>
10 CLS
20 FOR X=1 TO 5:PRINT:NEXTX
30 PRINTTAB(10)"DOCHITA D MAY"
40 PRINT
50 PRINTTAB(8)"510 HIGHLANDS AVE
"
60 PRINT:PRINTTAB(6)"INVERNESS,
FL, 32652
65 FOR C=1 TO 8
70 FOR H=0 TO 63STEP2:SET(H,0,C)
:NEXTH
80 FOR V=0 TO 31STEP+2:SET(63,V,
C):NEXTV
90 FOR H=63 TO 0 STEP-2:SET(H,31
,C):NEXTH
100 FOR V=31 TO 2 STEP-2:SET(0,V
,C):NEXTV
110 FOR H=2 TO 61 STEP2:SET(H,2,
C):NEXTH
120 FOR V=2 TO 29 STEP2:SET(61,V
,C):NEXTV
130 FOR H=59 TO 2 STEP-2:SET(H,2
9,C):NEXTH
140 FOR V=27 TO 4 STEP-2:SET(2,V
,C):NEXTV
150 FOR H=4TO59 STEP2:SET(H,4,C)
:NEXTH
160 FOR V=4TO27 STEP2:SET(59,V,C
):NEXTV
170 FOR H=57 TO4STEP-2:SET(H,27,
C):NEXTH
180 FOR V=25 TO 6 STEP-2:SET(4,V
,C):NEXTV
190 FOR H=6TO57 STEP2:SET(H,6,C)
:NEXTH
200 FOR V=6TO25 STEP2:SET(57,V,C
):NEXTV
210 FOR H=55 TO 6 STEP-2:SET(H,2
5,C):NEXTH
220 FOR V=23 TO6 STEP-2:SET(6,V,
C):NEXTV
230 FOR H=8TO55STEP2:SET(H,8,C):
NEXTH
240 FOR V=8 TO23 STEP2:SET(55,V,
C):NEXTV
250 FOR H=53 TO8STEP-2:SET(H,23,
C):NEXTH
260 FOR V=21 TO 8STEP-2:SET(8,V,
C):NEXTV
261 NEXTC:GOTO65
270 FORH=10TO53STEP2:SET(H,10,C)
:NEXTH
280 FOR V=10 TO21STEP2:SET(53,V,
C):NEXTV
290 FOR H=51 TO10STEP-2:SET(H,21
,C):NEXTH
300 FOR V=19 TO 12STEP-2:SET(10,
V,C):NEXTV
310 FORH=12 TO51 STEP2:SET(H,12,
C):NEXTH
320 FOR V=12 TO19 STEP2:SET(51,V
,C):NEXTV
330 FORH=49 TO12 STEP-2:SET(H,19
,C):NEXTH
340 FOR V=17 TO14 STEP-2:SET(12,
V,C):NEXTV
350 FORH=14TO49STEP2:SET(H,14,C)
:NEXTH
360 SET(49,16,C)
370 FOR H=47 TO14STEP-2:SET(H,16
,C):NEXTH
400 NEXTC
410 GOTO410
```

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A review of synonyms, homonyms and antonyms

Differences and Similarities

By Steve Blyn
Rainbow Contributing Editor

This month's program presents a language-arts review of synonyms, homonyms and antonyms. It can be used for almost any age student, but is designed mainly for elementary and middle-graders.

Synonyms are words that have the same meaning. Homonyms are words that sound exactly the same but are spelled differently and have different meanings. Antonyms are words that have opposite meanings.

Two words are presented on the screen at one time. The student's task is to decide whether the words are:

1. synonyms
2. homonyms
3. antonyms
4. unrelated and therefore none of the other choices.

There are 40 word pairs in the `DATA` lines. Each line contains the two words to be evaluated, followed by a comma and then the correct number of the answer to be pressed. As long as the format remains consistent, you may have as many `DATA` lines as you wish to include in your version of this program.

The computer keeps track of the number of word pairs that are included in the program by the variable `N` used on Line 30. Be certain to change the value of this variable if you should decide to alter the number of `DATA` lines.

The words selected by us are, for the most part, on an upper-elementary reading level. This was really an arbitrary choice and can be exchanged for any other level that suits your needs. You may type in your own vocabulary words instead of ours when you key in the `DATA` statements.

An interesting idea is to use data that includes words from the child's current spelling or vocabulary word lists. New lists can be added to the existing program or saved as programs of their own. You may, for example, save many copies of this program, each with a different set of data. Only the new data needs to be keyed in when you are proceeding in this manner. Be sure to save each new version with a name different from any of the previous versions.

Lines 30-70 have the computer read all of the data at the end of the program. Lines 80-190 print a random pair of words on the screen as well as the four choices. Lines 200-240 evaluate the student's answer. If an incorrect answer is given, the correct answer is displayed on the screen.

After each question is answered, the student may either press ENTER to go on or E to end the program. When the program is concluded, a score will be given. The computer constantly keeps track of the score. Each time a new example is given, the counter on Line 80 is increased by one; this is variable `X`. Each time a correct answer is given, the computer increases the counter on Line 230; this is variable `C`. The score is computed on Line 270. The formula used is `C/X*100`.

We hope you and your youngsters enjoy this program. We at Computer Island are always happy to learn of your uses of the programs appearing in this column. ☐

Steve Blyn teaches both exceptional and gifted children, holds two master's degrees and has won awards for the design of programs to aid the handicapped. He owns Computer Island and lives in Staten Island, New York.

The listing: `NYMS`

```
10 REM"REVIEW OF SYNONYMS-HOMONY
MS-ANTONYMS"
20 REM"STEVE BLYN,COMPUTER ISLAN
D,STATEN ISLAND,NY,1988"
30 N=40
40 DIM A$(N),A(N)
50 P$=STRING$(32,191)
60 FOR T=1 TO N
70 READ A$(T),A(T):NEXT T
80 CLS:X=X+1
90 PRINT@2,"homonyms-antonyms-sy
nonyms";
100 PRINT@64,P$
110 R=RND(N)
120 PRINT@98,A$(R)
130 PRINT@128,P$
140 PRINT@160,"1.BOTH ARE SYNONY
MS"
150 PRINT@196,"2.BOTH ARE HOMONY
MS"
160 PRINT@232,"3.BOTH ARE ANTONY
MS"
170 PRINT@268,"4.NONE OF THE ABO
VE"
180 PRINT@288,P$
190 PRINT@321,"WHICH TYPE ARE TH
ESE WORDS? ";
200 EN$=INKEY$
```

```
210 IF EN$="1" OR EN$="2" OR EN$
="3" OR EN$="4" THEN 220 ELSE 20
0
220 PRINTEN$
230 IF VAL(EN$)=A(R) THEN PRINT@
395,"CORRECT":C=C+1:GOTO 250
240 PRINT@389,"SORRY, THE ANSWER
 IS";A(R)
250 PRINT@454,"PRESS ENTER TO GO
 ON";
260 AN$=INKEY$
270 IF AN$=CHR$(13) THEN 80 ELSE
 IF AN$="E" THEN 280 ELSE 260
280 PRINT@452,"YOUR FINAL SCORE
IS";INT(C/X*100);"%.":END
290 DATA COARSE-COURSE,2
300 DATA METE-MEET,2
310 DATA SCENT-CENT,2
320 DATA HAPPY-JOYOUS,1
330 DATA NICHE-NOOK,1
340 DATA NOOK-KNOCK,4
350 DATA PARE-PEAR,2
360 DATA KNIGHT-AFTERNOON,4
370 DATA SLIM-THIN,1
380 DATA SNEER-FROWN,1
390 DATA STEAK-STAKE,2
400 DATA SITE-CITE,2
410 DATA REIN-REIGN,2
420 DATA THEIR-THOSE,4
430 DATA FOR-FOUR,2
440 DATA THEIR-THERE,2
450 DATA THERE-HERE,3
460 DATA DIRTY-SPOTLESS,3
470 DATA COLD-FRIGID,1
480 DATA FRIGID-WARM,3
490 DATA ICY-FRIGID,1
500 DATA FRIGID-RIGID,4
510 DATA OPEN-SHUT,3
520 DATA SHUT-SHOOT,4
530 DATA SHOOT-CHUTE,2
540 DATA BEACH-BIRCH,4
550 DATA BEACH-BEECH,2
560 DATA SECURE-SAFE,1
570 DATA LEAVE-EXIT,1
580 DATA LEAVE-LIVE,4
590 DATA KING-SOVEREIGN,1
600 DATA KING-PEASANT,3
610 DATA SOVEREIGN-PEASANT,3
620 DATA KING-RING,4
630 DATA ROUGH-SMOOTH,3
640 DATA ROUGH-SLEEK,3
650 DATA SLEEK-SMOOTH,1
660 DATA UNFAILING-CERTAIN,1
670 DATA AMBITIOUS-LAZY,3
680 DATA INDUSTRIOUS-LAZY,3
690 DATA AMBITIOUS-INDUSTRIOUS,1
700 DATA HARMFUL-HARMLESS,3
```

1988 -- The Year of the Hard Disk!

The CoCo XT hard disk interface from **Burke & Burke** lets you connect up to 2 low cost, PC compatible 5-120 Megabyte capacity hard drives to your CoCo. You buy the drive, Western Digital WD1002-WX1 or WD1002-27X (RLL) controller, and a case from the PC dealer of your choice. Just plug them into the CoCo XT, plug the CoCo XT into your Multi-PAK, and you have a 20 Meg OS9 hard disk system for **under $450!**

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RAINBOW CERTIFICATION SEAL

NOVICES NICHE

THE RAINBOW is a teaching environment and we realize that the majority of our readers will always be beginners. In our continuing effort to always keep the new user in mind, and in addition to the many beginner feature articles and programs published in every issue, "Novices Niche" contains shorter BASIC program listings that entertain as well as help the new user gain expertise in all aspects of the Color Computer: graphics, music, games, utilities, education, programming, etc.

Cryptogram Contest Update

The response to April's Cryptogram Contest has been overwhelming to say the least, and we wish we *could* give everybody a copy of *The Third Rainbow Book of Adventures*! Due to the flood of entries we have already received, we cannot notify each cryptologist of the status of his or her entry, but be patient — the lucky winner and everyone else who decoded the message will receive a mention in an upcoming Novices Niche. Again, the deadline is May 1, and the drawing will be held on May 3.

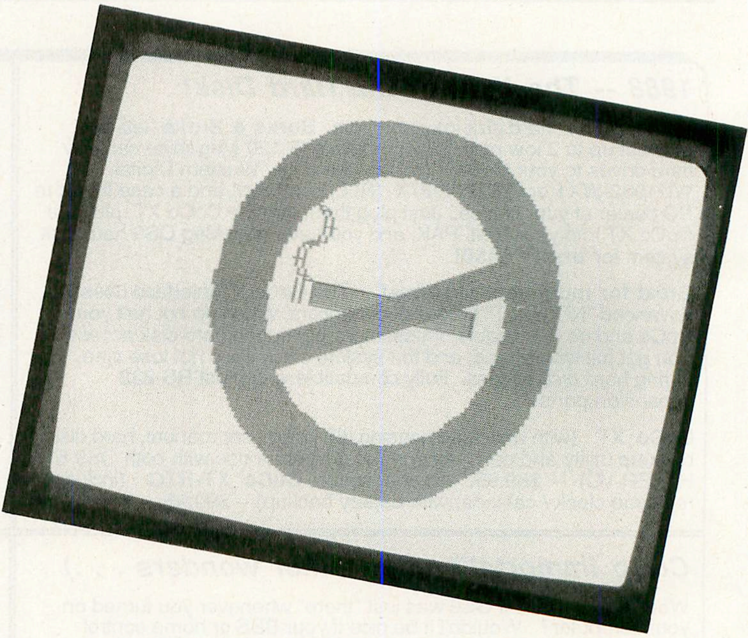
Graphics

Non-Smoking Section

16K
ECB

By Ana M. Rodriguez

Keep your relationship healthy — computers don't like smoke, and neither do your lungs! The next time someone enters your computer room in a puff of smoke, banish him or her with this graphics program (point to the screen). If you have a printer and a screen dump capable of dumping a PMODE 3 graphic, you can make a printout to hang on your door.



The listing: NO SMOKE

```
1 REM **     NO SMOKING     **
2 REM **         BY         **
3 REM ** ANA M RODRIGUEZ **
10 PMODE3,1:PCLS:SCREEN 1,1
30 CIRCLE (128,96),100
40 CIRCLE (128,96),70
50 LINE (185,61)-(65,121),PSET
60 LINE (195,75)-(75,135),PSET
70 LINE (85,88)-(130,88),PSET
80 LINE (85,100)-(106,100),PSET
90 LINE (85,88)-(85,100),PSET
100 LINE (144,100)-(178,100),PSE
T
110 LINE (178,100)-(178,88),PSET
120 LINE (170,88)-(178,88),PSET
130 LINE (79,88)-(79,100),PSET
140 LINE (75,88)-(75,100),PSET
141 CIRCLE (83,78),12,,1,.30,.70
142 CIRCLE (75,60),12,,1,.80,.20
143 CIRCLE (87,78),12,,1,.30,.70
144 CIRCLE (79,60),12,,1,.80,.20
150 PAINT (128,20), 0, 0
160 PAINT (185,62), 0, 0
170 PAINT (86,90), 3, 0
180 PAINT (176,98), 3, 0
1000 GOTO 1000
```

CoCo 3 Canvas

CoCo 3

By George and Ellen Aftamonow

Turn your CoCo 3 screen into an easel for this graphics program, and watch as CoCo paints a path into modern art. The longer the program runs, the more colorful and diverse the "canvas" becomes. The program uses only three palettes but continually puts new colors into them.

The listing: CANVAS

```
10 'GEORGE AFTAMONOW
20 CLSRND(8):PRINT@233,"COCO3 CA
NVAS";
30 FORT=1TO1000:NEXT
40 HSCREEN2
50 G1=RND(64)-1:PALETTE1,G1:G2=R
ND(64)-1:PALETTE2,G1:G3=RND(64)-
1:PALETTE3,G3
60 IFG1=G2 OR G1=G3 OR G2=G3 THE
N50ELSEPALETTE2,G2
70 HCOLOR1,2
80 Z=RND(10)+1
90 FORX=1TO255STEPZ+2:Y=1:X1=1:Y
1=191-(X/1.5):HLINE(X,Y)-(X1,Y1+
RND(4)),PSET:NEXTX
100 FORX=1TO320STEPZ+2:X1=320:Y1
=X/1.5:HLINE(X,Y)-(X1,Y1+RND(4))
,PSET:NEXTX
110 FORX1=255TO1STEP-Z-2:X=320:Y
=191-X1/1.5:Y1=191:HLINE(X,Y)-(X
1,Y1),PSET:NEXTX1
120 FORX1=320TO1STEP-Z-2:X=1:Y=X
1/2.33:Y1=191:HLINE(X,Y)-(X1,Y1)
,PSET:NEXTX1
130 HCOLORRND(16)-1,RND(16)-1:HC
IRCLE(160,96),R,3,RND(10)*.1
140 FORE=1TORND(9):X=RND(320):Y=
RND(191):C=RND(9)-1:C1=RND(9)-1:
HCOLORRND(9)-1,RND(9)-1:HCIRCLE(
X,Y),RND(100),C,RND(10)*.1
150 HPAINT(X,Y),C1,C:NEXTE
160 FORX=1TO320STEPZ:HLINE(0,191
)-(X,0),PSET:NEXT
170 FORX=1TO320STEPZ:HLINE(320,0
)-(X,191),PSET:NEXT
180 FOREE=1TO10:PALETTE1,RND(64)
-1:PALETTE2,RND(64)-1:PALETTE3,R
ND(64)-1:NEXT
190 GOTO90
```

Printer

Ticket Maker

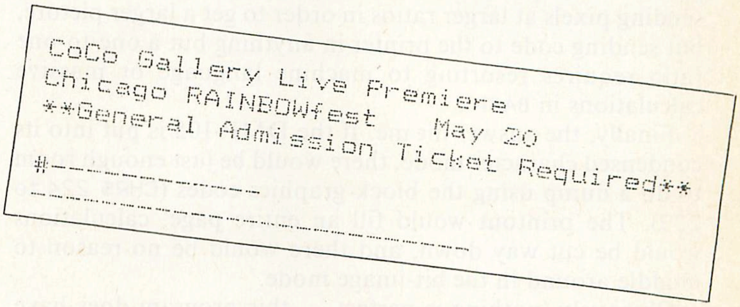
4K

By Ed Schenck

Has your club ever needed raffle tickets for a fund-raiser or tickets for entrance to a club-sponsored event? If so, then *Ticket* is for you. *Ticket* is adaptable for whatever type of tickets you need. The program prints tickets continuously due to a GOTO loop, so you'll need to press BREAK to stop. Delete Line 116 if you want to print only one ticket at a time.

The listing: TICKET

```
1 CLS
5 PRINT"************"
10 PRINT"TICKET MAKER"
20 PRINT"BY ED SCHENCK"
25 PRINT"************"
26 PRINT"PUT A SHEET OF PAPER IN
 YOUR PRINTER AND GET READY"
30 PRINT"WHAT WOULD YOU LIKE ON
THE FIRST LINE?"
35 INPUT A$
40 PRINT"WHAT WOULD YOU LIKE ON
YOUR SECOND LINE?"
45 INPUT B$
50 PRINT"WHAT WOULD YOU LIKE ON
YOUR THIRD LINE?"
55 INPUT C$
```



```
CoCo Gallery Live Premiere
Chicago RAINBOWfest   May 20
**General Admission Ticket Required**
#------------
-------------------------
```

```
60 PRINT"WHAT WOULD YOU LIKE ON
YOUR FOURTH LINE?"
65 INPUT D$
70 PRINT"WHAT WOULD YOU LIKE ON
YOUR FIFTH LINE?"
75 INPUT E$
76 PRINT"THIS WILL PRINT CONTINU
SLY."
77 PRINT"NOW PRINTING......."
80 PRINT#-2,A$
85 PRINT#-2,B$
90 PRINT#-2,C$
100 PRINT#-2,D$
110 PRINT#-2,E$
111 PRINT#-2,"#------------"
115 PRINT#-2,"------------------
-------"
116 GOTO 80
120 PRINT"DONE!!!"
```

Graphics Reference Chart

4K

By Daniel T. Weaver

Tandy supplied me with the formula for figuring out graphics codes when I bought my CoCo, but I quickly got tired of plugging in variables and performing the mathematical functions. GRAFCODE made all those calculations unnecessary. Just run the program while your printer is online to create a handy reference chart. But watch your screen to see the graphics characters!

The listing: GRAFCODE

```
0 PRINT#-2,TAB(6);"HANDY GRAPHIC
S CODE REFERENCE CHART":PRINT#-2
,TAB(6);"COLOR","+PATTERN","=COD
E#":'INSERT FANFOLD PAPER, TURN
 ON PRINTER, BUT WATCH SCREEN!
1 FORC=1TO8:FORP=0TO15:D=128+16*
(C-1)+P:PRINT"CODE#"D"="CHR$(D)C
HR$(13):PRINT#-2,TAB(6);C,P,D:NE
XTP:NEXTC:PRINT#-2,TAB(6);"1=GRE
EN 2=YELLOW 3=BLUE 4=RED 5=BUFF
6=CYAN 7=MAGENTA 8=ORANGE":PRINT
#-2,TAB(6);"FOR PATTERNS CONSULT
 COCO OWNER'S MANUAL"
```

A Full-Page Dump for the DMP-105

16K
ECB

By John Handis

I have written several screen dumps in BASIC, and they produced pixels at a one-to-one ratio. In other words, for every pixel on the screen, the printer would produce one dot on the page, which resulted in very small pictures. Also, the printer did not correct for the CoCo's irregularly shaped pixels — the printouts were coming out squashed. I tried sending pixels at larger ratios in order to get a larger picture, but sending code to the printer in anything but a one-to-one ratio requires resorting to machine language or massive calculations in BASIC.

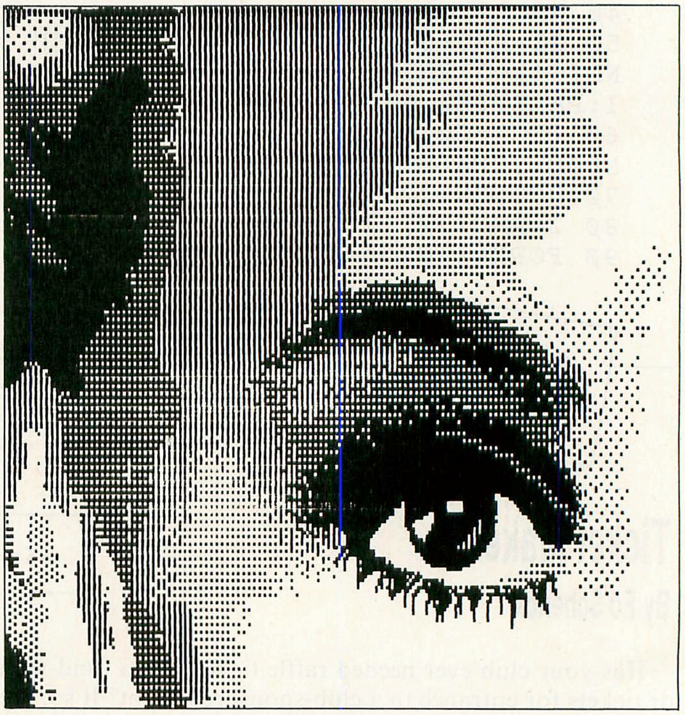
Finally, the answer hit me. If the DMP-105 is put into its condensed character mode, there would be just enough room to do a dump using the block graphics codes (CHR$ 224 to 239). The printout would fill an entire page, calculations would be cut way down, and there would be no reason to muddle around in the bit-image mode.

Obviously, nothing is perfect — this program does have its drawbacks. First, the dump is still pretty slow, taking about 15 to 20 minutes to do a PMODE 4 screen. The dump should work in any two-color PMODE as long as you change the PMODE value in Line 20, but it will not work in four-color modes. Also, the condensed blocks overcompensate for CoCo's irregularly shaped PMODE 4 pixels — now, instead of being squashed horizontally, they are squashed vertically! And another thing. According to the DMP-105 manual, graphics printing puts a strain on the print head. It suggests stopping every 1/6 page and giving the print head at least one minute's rest to keep it from overheating. If you are worried about overheating the print head, add this line, which will pause the printer for one minute every 1/6 page:

```
55 IF Y/22=INT(Y/22) AND Y>0 THEN FOR K=0 TO
3600:NEXT
```

The listing: BIGDUMP

```
5 DIM C(15)
10 PRINT#-2,CHR$(27);CHR$(20):'C
OMPRESSED MODE
20 PMODE4,1:SCREEN1,1:PRINT#-2,C
HR$(27);CHR$(28):'1/2 LINEFEED
30 FORC=0TO15:READ C(C):NEXT
40 DATA 224,225,226,231,227,233,
230,235,228,229,234,236,232,237,
238,239
45 PRINT#-2,CHR$(224);CHR$(224);
50 FORY=0TO191STEP2:FORX=0TO255S
TEP2
60 C=0
70 IF PPOINT(X,Y)=0 THEN C=C+1
80 IF PPOINT(X+1,Y)=0 THEN C=C+2
90 IF PPOINT(X,Y+1)=0 THEN C=C+4
100 IF PPOINT(X+1,Y+1)=0 THEN C=
C+8
110 PRINT#-2,CHR$(C(C));:NEXT:PR
INT#-2,CHR$(13);CHR$(224);CHR$(2
24);
120 NEXT
130 PRINT#-2,CHR$(27);CHR$(19):'
```



```
STANDARD CHARACTER SET
140 PRINT#-2,CHR$(27);CHR$(54):'
FULL LINEFEED
```

```
150 END
160 'COPYRIGHT (C) 12/29/1985 BY
 JOHN W. HANDIS
```

Utilities

Color in 32 Columns

CoCo 3

By Chuck Katsekes

Having luxuriated in 80 columns and all the possible combinations of color, do you CoCo 3 owners find yourselves nostalgically reminiscing about the good ol' days of 32-column CoCoing (when the eye strain was not as great)? Do you like being able to sit back — way back — and relax and still be able to read your screen without squinting? So what's keeping you squinting at 80 columns? Color — black on green just does not excite you.

Pal 32 is here to save your eyes. You can have your eye-soothing text and bask in the CoCo 3's palette of colors, too. Just run the program and answer the prompts for the desired foreground and background colors, and your eyes will thank you.

The listing: PAL32

```
10 '32 COLUMN PALETTE UTILITY
20 '(C) COPYRIGHT 1987
30 ' BY CHUCK KATSEKES
40 CLS
50 PRINT@0,STRING$(33,175)
60 PRINT@33,"32 COL. SCREEN PALE
TTE UTILITY":PRINT@63,STRING$(1,
175)
70 PRINT@64,STRING$(32,175)
80 PRINT@98,"X=BACKGROUND  Y=FOR
EGROUND"
90 PRINT@132,"<0-63>":PRINT@146,
"<0-63>"
100 FOR X=0 TO 63
110 FOR Y=0 TO 63
120 PRINT:PRINT"X =";:INPUT X
130 PRINT:PRINT"Y =";:INPUT Y
140 CLS:POKE&HFFBD,X:POKE&HFFBC,
Y
150 END
```

Phrase Centerer

16K ECB

By Gip Wayne Plaster, II

One of the biggest pains for new programmers is trying to program aesthetic text screens. Centering text requires constant reference to the `PRINT@` chart in the manual, and also a lot of trial and error. This short program eliminates frantic flipping of pages. Just run the program, type in your phrase and on what line of the screen you would like it to appear (there are 16 lines), and it gives you the proper `PRINT@` location. This way you can design your text screen before you program it.

The listing: CENTERER

```
10 '****************************
20 '**PHRASE CENTERER**********
30 '**A  COCO  QUICKY**********
40 '**BY GIP WAYNE PLASTER*****
50 '****************************
60 CLS
70 LINE INPUT"STRING:";S$
80 L=LEN(S$)
90 IFL>32THENPRINT"TOO LONG":GOT
070
100 PRINT"THIS PHRASE HAS"L"CHAR
ACTERS."
110 PRINT"ON WHAT LINE DO YOU WI
SH TO     PRINT?"
120 INPUT"ENTER 1-16:";R
130 IFR>16 OR R<1THEN120:' WILL
NOT ALLOW MORE THAN 16 OR LESS T
HAN 1
140 R=R-1:' CONVERT LINE TO COMP
UTER'S NUMBERING SYSTEM
150 LN=R*32:' CONVERTS FOR 32 CO
LUMN SCREEN
160 X=(32-L)/2:' FIND NUMBER OF
SPACES BEFORE PHRASE
170 CC=LN+X:' ADDS SPACES AND LI
NE
180 LC=INT(CC):' MAKES SURE NUMB
ER IS INTEGER
190 PRINT"THE PRINT @ LOCATION I
S";LC
200 PRINT"DO YOU WANT TO TRY AGA
IN?"
210 A$=INKEY$:IFA$=""THEN210
220 IFA$="Y"THEN70
```

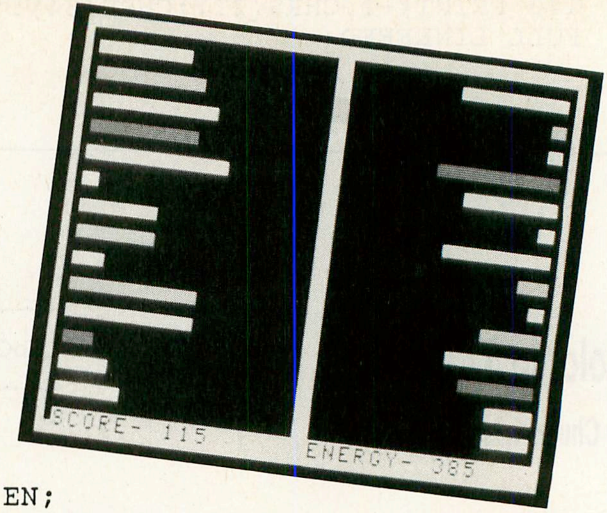
Game

Blockout Wipeout

By Tony Owens

Blockout is a short program full of fast and colorful action. The object is to keep the ever-growing blocks from reaching the center rail. To do this, use your right joystick to move your cannon up and down; press the firebutton and move left or right to fire. It is best to go for the longer blocks; if they reach your rail, they will deplete your energy.

The game has two levels and could be modified for more. The high-speed poke was left out but could be added. It's lightning fast with the high-speed poke on the CoCo 3!



The listing: BLOCKOUT

```
10 '-BLOCKOUT-'
20 'BY TONY OWENS'
30 'MONMOUTH,OREGON'
40 DIMA(16):DIMB(16):DIMC(16):DI
MD(16):DIME(16):DIMY(16):V=8:LV=
0:PLAY"T255L255"
50 CLS0:EG=EG+1:IF EG>2 THEN GOT
O360
60 FORY=1TO14:A(Y)=0:B(Y)=0:E(Y)
=0:NEXTY
70 FORX=1TO14:C(X)=0:D(X)=0:E(X)
=0:NEXTX
80 T=0:X=0:Y=0:EN=500:C=0:A=0
90 GOSUB160
100 A=0:FORT=1TO15:PRINT@31+A,CH
R$(165);CHR$(170);:A=A+32:NEXTT
110 PRINT@1,STRING$(30,172);:POK
E1024,174:POKE1024+31,173
120 PRINT@481,STRING$(30,32);:PO
KE1535,175:POKE1504,171
130 FORX=1040TO1488STEP32:POKEX,
175:NEXTX
140 PRINT@481,"SCORE- 0";:PRINT@
497,"ENERGY- 500";:POKE1520,175
150 GOTO 210
160 FORY=0TO14:A(Y)=1040+A:A=A+3
2:NEXTY:A=0
170 FORY=1TO15:Y(Y)=Y(Y)+A:A=A+4
.5:NEXTY:A=0
180 C=140-(6*LV):FORX=1TO8:E(X)=
C:E(X+8)=C:C=C+16:NEXTX
190 FORX=0TO14:C(X)=1040+A:A=A+3
2:NEXTX:A=0
200 RETURN
210 Y=RND(14):X=RND(14)
220 PRINT@A(Y)+B(Y)-1039,CHR$(E(
Y));:B(Y)=B(Y)+LV+.5
230 IF B(Y)>14 THEN EN=EN-10:B(Y
)=13:PLAY"O1ABCDCBA"
240 PRINT@C(X)+D(X)-1010,CHR$(E(
X));:D(X)=D(X)-LV-.5
250 IF D(X)<-13 THEN EN=EN-10:D(
X)=-13:PLAY"O1ABCDCBA":PRINT@504
,EN;
260 IF EN<0 THEN LV=LV+.5:GOTO35
0
270 J=JOYSTK(0):IF PEEK(345)=254
 THEN 320
280 J2=JOYSTK(1):IF J2<20 THEN V
=V-1:IF V<1 THEN V=1
290 IF J2>40 THEN V=V+1:IF V>14
THEN V=14
300 POKEA(V),255:POKEA(V)-32,175
:POKEA(V)+32,175
310 IF PEEK(345)=255 THEN 210
320 IF J<33 THEN FORS=A(V)+13 TO
 A(V)+B(V)+1 STEP-2:PRINT@S-1040
,CHR$(125);CHR$(128);CHR$(128);:
NEXT:PLAY"O4ADG":B(V)=B(V)-2:PRI
NT@S-1038,CHR$(128);:IF B(V)<0 T
HEN B(V)=0
330 IFJ>33THENFORS=A(V)+17 TO A(
V)+28+D(V)STEP2:PRINT@S-1040,CHR
$(128);CHR$(128);CHR$(123);:NEXT
:PLAY"O2GDA":D(V)=D(V)+2:PRINT@S
-1040,CHR$(128);:IFD(V)>0THEN D(
V)=0
340 EN=EN-1:SC=SC+1:PRINT@487,SC
;:PRINT@504,EN;:GOTO210
350 IFEG=2THEN360 ELSE FORX=1TO3
0STEP2:PLAY"V+ABC":NEXTX:CLS0:PR
INT@106,"next";CHR$(128);"level"
;:FORX=1TO1000:NEXTX:GOTO50
360 CLS0:PRINT@105,"to";CHR$(128
);"play";CHR$(128);"again";:PRIN
T@137,"press";CHR$(128);"any";CH
R$(128);"key";
370 FORX=1TO5000:IF INKEY$=""THE
N NEXTELSERUN
```

Submissions to "Novices Niche" are welcome from everyone. We like to run a variety of short programs that can be typed in at one sitting and are useful, educational and fun. Keep in mind, although the short programs are limited in scope, many novice programmers find it enjoyable and quite educational to improve the software written by others.

Program submissions must be on tape or disk. We're sorry, but we cannot key in program listings. All programs should be supported by some editorial commentary, explaining how the program works. If your submission is accepted for publication, the payment rate will be established and agreed upon prior to publication.

Make eye-catching newsletters with this two-column formatter

Printing In Two Columns

By Charles E. Brown, Jr.

Steve Lai's listing program (May 1985, Page 42) is designed to let you print a program listing in two columns on each page, saving paper and allowing easy comparison of screen to printout. The program works well and fills a need as is, but given minor modifications, it could well serve many other purposes.

Let's look at one example. With very few changes, the program could become valuable for the creation of newsletters by small businesses and clubs. Additionally, they could modify their customary correspondence format, offering polish and pizazz.

I have redesigned Lai's program in order to give my correspondents letters unlike any they have received from other writers. Writing letters in such a new style is much like wearing a new and different suit, knowing that you'll attract attention on every street corner. You are doing something different and unique, expressing your individuality and personality.

My modified program is called LETTERS. It provides enough header space at the top of Page 1 for you to design and insert your own logo or letterhead. Accompanying LETTERS is PERSLOGO, which prints a logo at the top of Page 1. Your examination of PERSLOGO will show how easily the desired text can be printed. A little study of the five data lines for block graphics may be needed to design your own graphics logo. Experiment and enjoy.

LETTERS will accept any ASCII file prepared by your word processor. But you must set your right margin so that you type no more than 36 characters per line (approximately half a page), and you must put a carriage return at the end of each line. Leave no blank lines at the top of the first page, and prepare your ASCII text without header space or embedded word processor printer codes of any kind other than the carriage returns. LETTERS will do all formatting and margin control for you.

There are variations among printers and word processing programs. For yours, some experimenting may be necessary. I use an Epson MX-80 printer with VIP Writer. In VIP Writer, I find that the first character is always lost. So I must insert one blank space at the very beginning of my text.

Chuck Brown, who began computing in 1976, is a self-taught programmer interested in artificial intelligence for the Color Computer. He and his wife, Barbara, live in White Stone, Virginia, and own West Bay Company.

I have left printer codes out of my program, allowing you to insert your printer's codes at the beginning of LETTERS. If you want your columns to be right justified, you must refer to your printer and word processing manuals.

Up and Running

Use your own modification of the PERSLOGO program, changing the Epson printer codes to match your printer. When the program is run, it will end by showing an OD Error. Reposition your first page to the top of the page (perforation).

Now load and run LETTER, which will help you input your ASCII text file and will give you the desired two-column output, with each page numbered in sequence. Merely follow the simple instructions on your screen.

Enjoy your letter writing. You will make an impact by giving your correspondence a neat and different appearance that will get your reader's attention. □

Editor's Note: The Personal Logo *program is intended for use with an Epson MX-80 printer. Because the data used is that of the author, it will require alteration. The special control codes used are as follows:*

CHR$(14)	*turn on double width till next carriage return*
CHR$(27)CHR$(69)	*turn on emphasized mode*
CHR$(27)CHR$(70)	*turn off emphasized mode*
CHR$(27)CHR$(71)	*turn on double-strike mode*
CHR$(27)CHR$(72)	*turn off double-strike mode*

In addition, the data lines 90 through 120 represent graphics characters which will need to be changed for your own logo. Subtract 32 from each value used since 32 is added by the program in Line 20. You may have to enter the graphics mode to achieve graphics characters on your printer.

45	111	420	89
125	70	END	61
280	24		

Listing 1: LETTER

```
5 'PROGRAM: LETTERS/TWO, GIVES
   TWO COLUMN PRINTING, WITH
   HEADER SPACE
10 CLEAR15000
11 CO=80  'PAGE WIDTH FOR TOTAL
TEXT
12 NL=45  'LINES PER FIRST PAGE
          (LINE COUNTER)
13 TM=10  'WIDTH OF TOP MARGIN
          (VARY FOR LETTERHEAD)
14 SP=0   'SINGLE PAGE FLAG
          (CONTINUOUS/SINGLE PG)
15 LE=0   'LENGTH OF DATA ENTRY
16 'CN   = COUNTER FOR CHARACTER
S  (RD$=INPUT CHARACTER READ)
17 'LF   = LINEFEED
18 'PL$  = PRINT LINE STRING
19 'ST   = FLAG FOR FINISH OF WO
RK
20 DIMPL$(116):AL=0:CN=1:Z$=CHR$
(128):PG=0  '(PG=PAGE COUNTER)
21 BL$=STRING$(32,32)  '1 LINE O
F BLANKS ON SCREEN
22 IN=INT((CO/80)/2)  'DETERMINE
S PAGE CENTERLINE
25 '-----------MAIN MENU
30 CLS:PRINT"   TWO COLUMN PROGR
AM LISTER":PRINTSTRING$(32,131);
40 PRINTZ$"note"Z$" THE FILE TO
BE USED      MUST BE IN 'ASCII
' FORMAT."
45 PRINT:PRINTZ$"filename"Z$" ";
50 LINEINPUTDN$:IFLEFT$(RIGHT$(D
N$,4),1)<>"/"THEN DN$=DN$+"/BAS"
60 IF LEN(DN$)>12 OR LEN(DN$)<5
THEN30
65 PRINT:PRINTZ$"source"Z$"drive
"Z$" ";:INPUTDD:DRIVEDD
70 PRINT:PRINTZ$"city"Z$"and"Z$"
date"Z$" "  'INPUT, NEXT LINE, M
AY BE UP TO 79 CHARACTERS, CENTE
RED ON PAGE
80 LINEINPUT  " ";NM$:LE=LEN(NM
$):IFLE>CO THEN70
90 PRINT:PN=INT((CO-LE)/2)
100 PRINTZ$"stop"Z$"for"Z$"each"
Z$"page"Z$" Y/N "
110 I$=INKEY$:IFLEFT$(I$,1)="Y"
ORLEFT$(I$,1)="y" THENSP=1 ELSEI
FLEFT$(I$,1)<>"N" ANDLEFT$(I$,1)
<>"n" THEN110 ELSESP=0
119 '----------LOAD THE DATAFILE
 TO BE PRINTED
120 CLS:PRINT"   LOAD THE FILE
FROM DISK":PRINTSTRING$(32,131);
125 PRINT:PRINTZ$"insert"Z$"data
"Z$"disk"Z$"in"Z$"drive"Z$;DD
128 PRINT:PRINT:PRINTZ$"press"Z$
"enter"Z$"to"Z$"continue"Z$;:INP
UTAN$
130 OPEN"D",#1,DN$,1
140 FIELD#1,1 AS RD$
150 LF=LOF(1)
```

```
160 '----------SET UP NEW PAGE F
OR PRINTING
190 CLS:PRINT"       PREPARE FOR
NEW PAGE":PRINTSTRING$(32,131);:
PG=PG+1
200 PRINT:       PRINT" PLEASE WA
IT.":PRINT:PRINT" PRINT LINES AR
E BEING COUNTED.":PRINT:PRINT" P
RINTING WILL START BEFORE THIS N
UMBER SHOWS"NL*2+1
205 PRINT@331,CHR$(129);STRING$(
5,131);CHR$(130):PRINT@363,CHR$(
133);:PRINT@369,CHR$(138):PRINT@
395,CHR$(132);STRING$(5,140);CHR
$(136)
210 FOR F=1 TO NL*2:PL$(F)=BL$:N
EXT F
220 FORF1=1TONL*2:PL$(F1)=STRING
$(37,32)  '37 SHOWS COLUMN WIDTH
 (INCLUDES CR)
230 FORF2=1TO37:CN=CN+1:IFCN>LF
THENST=1:GOTO300  '37 SHOWS COLU
MN WIDTH (INCLUDES CR)
240 GET#1,CN
250 IFRD$=CHR$(13) THEN280
260 MID$(PL$(F1),F2,1)=RD$
270 NEXTF2
280 PRINT@364,F1;:NEXTF1
300 IFSP=1 THENGOSUB400 ELSEIFAL
=0 THENGOSUB400 ELSEPRINT#-2:PRI
NT#-2
310 PRINT@480,        Z$"now"Z$"p
rinting"Z$:FORF=1 TONL:PRINT#-2,
TAB(IN);PL$(F);"      ";PL$(F+NL
)
320 NEXT
325 PRINT#-2:PRINT#-2,TAB(36)"Pa
ge"PG
330 IFST=1THENPRINT#-2,CHR$(12):
GOTO450
340 PRINT#-2,CHR$(12):NL=56:GOTO
190  '56 SHOWS NUMBER OF LINES,
PAGE 2 AND AFTER
390 '----------READY A NEW PAGE
FOR PRINTING
400 AL=1:CLS:PRINT"         INSERT
 NEW PAGE":PRINTSTRING$(32,131);
:PRINTZ$"position"Z$"new"Z$"page
"Z$"in"Z$"printer"Z$
405 PRINT:PRINT:PRINTZ$"press"Z$
"enter"Z$"to"Z$"continue"Z$" ";:
LINEINPUTI$
410 PRINT#-2,STRING$(TM,13):PRIN
T#-2,TAB(PN);NM$:PRINT#-2:RETURN
420 '----------JOB IS FINISHED
450 CLOSE:CLS:PRINT"        PRINTI
NG IS FINISHED":PRINTSTRING$(32,
131);:PRINT" THE TWO COLUMN PRIN
TING IS      FINISHED."
455 PRINT:PRINT:PRINT" PRESS 'Y'
 FOR ANOTHER PRINTING  OR PRESS
```

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```
'N' TO STOP.":PG=0
460 I$=INKEY$:IFLEFT$(I$,1)="Y"
ORLEFT$(I$,1)="y" THENRUN ELSEIF
LEFT$(I$,1)="N" ORLEFT$(I$,1)="n
" THENEND ELSE460
550 'FIRST SPACE ALWAYS LOST. SO
     INDENT ONE SPACE TO START.
560 'USE NO PRINT CODES IN TEXT.
     CARRIAGE RETURN AFTER LINE.
570 'DO NOT PLACE HEADER SPACES
     IN FILE COPY. PROGRAM = 3,
     OR 10 IF USING LETTERHEAD.
580 'IF DATE IS TO BE PRINTED BY
     PROGRAM, TOP CENTER, DO NOT
     PLACE DATE IN DATA COPY.
590 'USE VIP/WRITER LINELENGTH
     OF 37, NON JUSTIFIED.
1990 'NOTE THAT YOU MUST COUNT
      ANY 37-CHARACTER LINE AS
      INCLUDING THE CARRIAGE
      RETURN (36 CHARACTERS +CR)
2000 'LETTERS/TWO,  870424. WAS
ORIGINALLY '2-COLUMN/BAS' IN THE
MAY 1985 RAINBOW, PAGE 44, BY
STEPHEN LAI. PROGRAM MODIFIED BY
C E BROWN FOR NEWSLETTERS AND
CORRESPONDENCE USE.
```

Listing 2: PERSLOGO

```
5 PRINT#-2:PRINT#-2:PRINT#-2
10 PRINT#-2,CHR$(27)CHR$(69)CHR$
(27)CHR$(71)
20 READA:IFA>100 THENPRINT#-2,TA
B(8)CHR$(A+32);:GOTO20
30 IFA>0 THENPRINT#-2,STRING$(A,
B+32);:GOTO 20
40 IFA=0 THEN PRINT#-2:GOTO20
50 ONABS(A) GOSUB60,70,80:GOTO20
60 PRINT#-2,TAB(28)CHR$(14)"CHAR
LES E. BROWN JR":RETURN
70 PRINT#-2,TAB(39)        "ROUT
E 1, BOX 590":RETURN
80 PRINT#-2,TAB(31)          "WHIT
E STONE, VIRGINIA 22578-9765":RE
TURN
90 DATA 151,131,131,131,131,131,
131,131,131,131,131,171,0
95 DATA 149,128,170,151,139,133,
170,151,171,149,128,170,-1
100 DATA 149,128,170,149,160,144
,170,151,171,148,128,170,-2
110 DATA 149,128,138,141,142,133
,138,    141,142,133,128,170,-3
120 DATA 141,140,140,140,140,140
,140,140,140,140,140,142,0
1000 PRINT#-2,CHR$(27)CHR$(70)CH
R$(27)CHR$(72)
2000 'PERSLOGO/BAS, 870429. WILL
      PRINT PERSONAL LETTERHEAD
      AND GRAPHICS
```

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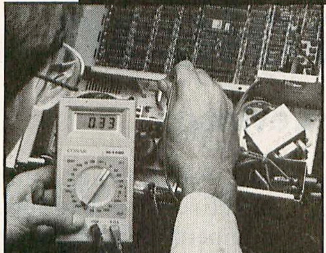

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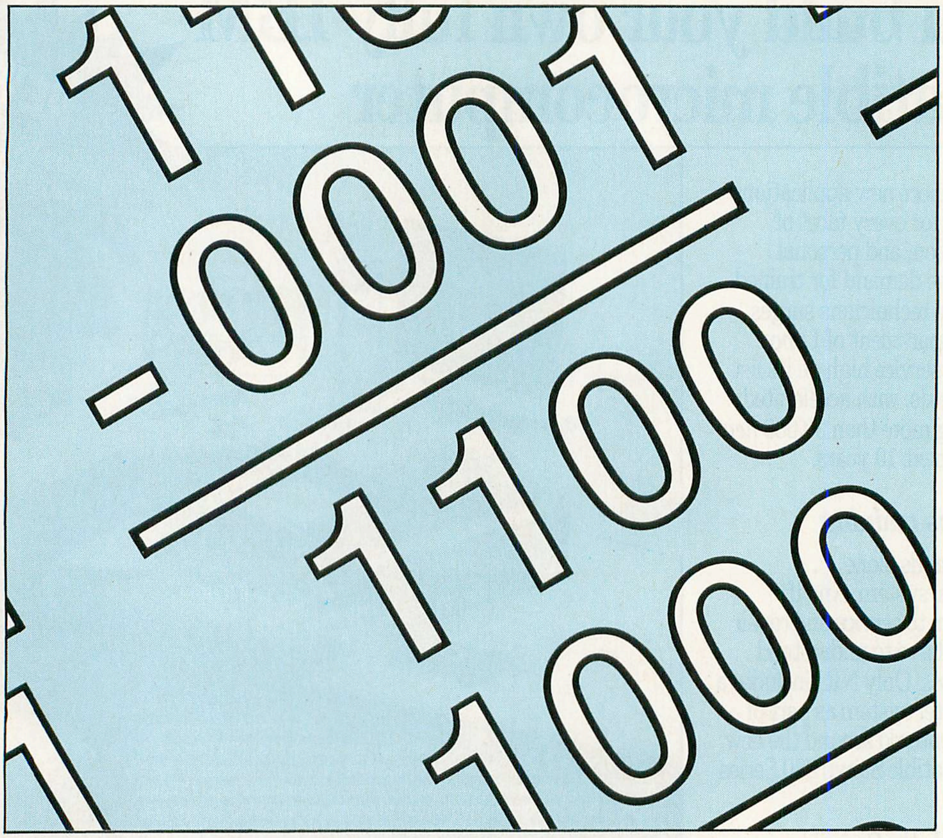

The Ins and Outs of Boolean

By Eric Levinson

This program was designed to test students in Boolean addition, multiplication and subtraction. There are 20 questions and you must answer the question correctly by pressing either a 0 or 1. The 0 stands for a binary "off" state while the 1 stands for a binary "on" state. The right arrow allows you to make corrections by completely erasing your answer.

When the program is run, the computer asks for your name. This allows a whole classroom to use and store each student's results on disk or cassette. Student records may then be called up by typing `PRINT SCORES` at the first prompt.

The first five problems ask you to add two 4-digit binary numbers, and the next five ask you to subtract two 4-digit numbers. The following five ask you to multiply two 4-bit numbers, and the last five problems ask you to add two 8-bit numbers. Notice that the last five problems are timed, but the results of the timing are not recorded on disk.

Cassette operation may be used by changing the following lines:

```
1560 OPEN"O",#-1,LEFT$ (N$,8)
1570 PRINT#-1,R,R1,R2,R3,W,
 W1,W2,W3,N$
1580 CLOSE #-1
1670 OPEN"I",#-1,N$
1680 INPUT#-1,R,R1,R2,R3,W,
 W1,W2,W3,N$
1690 CLOSE #-1
```

Eric Levinson is studying to be an electronics engineer. Previously, he was a service technician for Apple, IBM, Zenith and Compaq.

(Questions or comments may be addressed to the author at 151 Hearthstone, Irvine, CA 92714. Please enclose an SASE when requesting a reply.) ☐

```
240 ......186  1220 .......7
500 ......115  1470 .....251
750 .......36  1600 ......83
970 ......170  END .....172
```

The listing: BOOLEAN

```
10 '     PROGRAM DEVELOPED AND W
RITTEN BY
20 '     ERIC LEVINSON
30 '     1039 NEVADA STREET
40 '     GLENWOOD, IL 60425
50 '     (312) 799-6747
60 '     COPYRIGHT (C) 1987
70 CLEAR 5000
80 DIM B$(255)
90 CLS
100 PRINT"BINARY ARITHMETIC"
110 PRINT"BY ERIC LEVINSON"
120 PRINT"WHAT IS YOUR NAME";
130 INPUT N$
140 IF N$="PRINT SCORES" THEN 16
30
150 PRINT"STANDBY"
160 AA=0
170 FOR A=0 TO 1
180 FOR B=0 TO 1
190 FOR C=0 TO 1
200 FOR D=0 TO 1
210 IF A=1 THEN A$="1"ELSE A$="0
"
220 IF B=1 THEN B$="1"ELSE B$="0
"
230 IF C=1 THEN C$="1"ELSE C$="0
"
240 IF D=1 THEN D$="1"ELSE D$="0
"
250 B$(AA)=A$+B$+C$+D$
260 AA=AA+1
270 NEXT D,C,B,A
280 FOR A=1 TO 5
290 CLS
300 A1=RND(16)-1:A2=RND(16)-1
310 IF A1+A2>15 THEN 300
320 PRINT@0,"PROBLEM #"A
330 PRINT@172,B$(A1)
340 PRINT@203,"+"B$(A2)
350 PRINT@235,"-----"
360 B$=""
370 GOSUB 1160
380 ANS$=B$(A1+A2)
390 FOR B=0 TO 15
400 IF B$=B$(B) THEN 410 ELSE NE
XT B
410 IF B=A1+A2 THEN PRINT@267,"R
```

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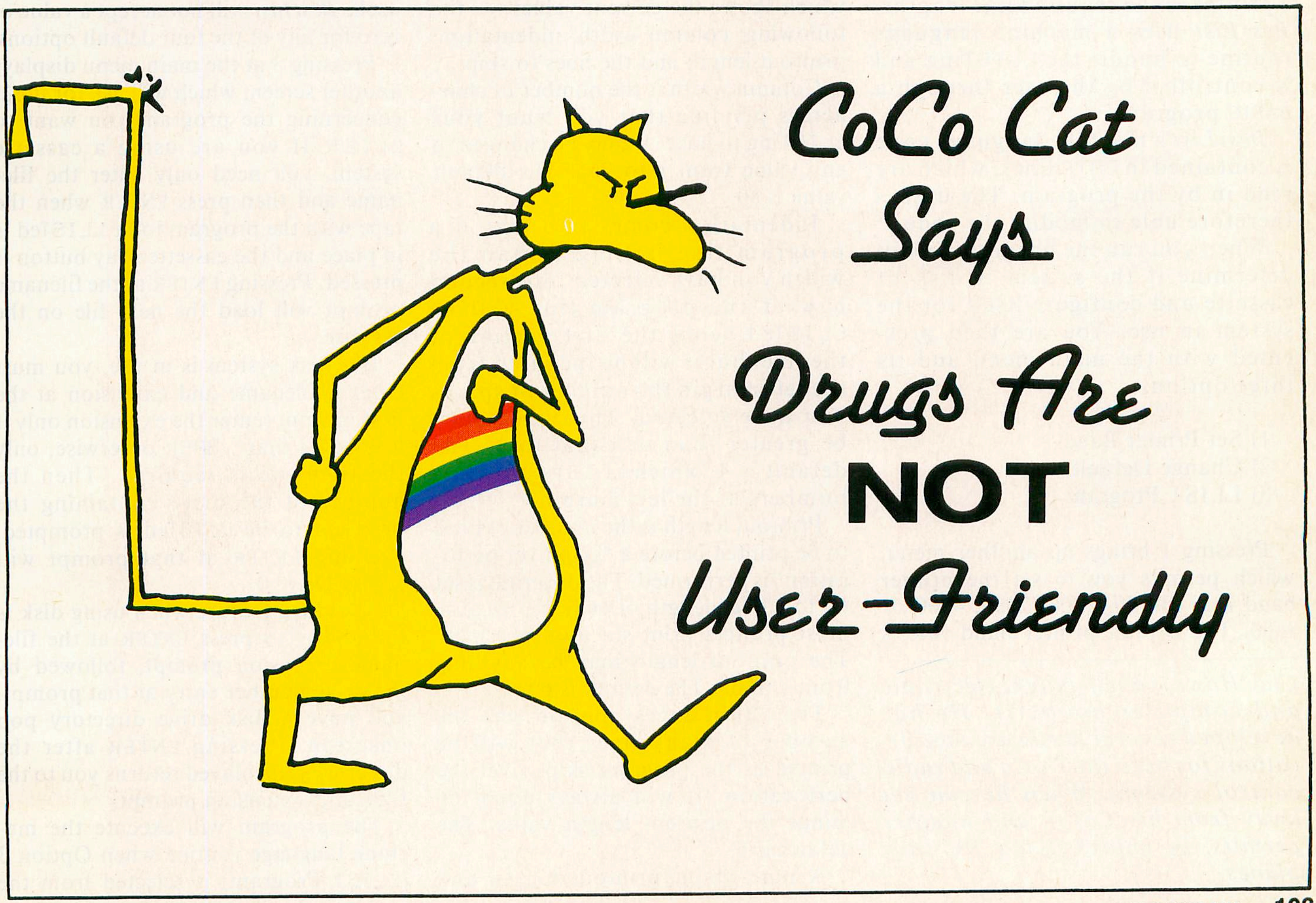
```
IGHT":R=R+1
420 IF B<>A1+A2 THEN PRINT@267,"_
WRONG":W=W+1
430 FOR AA=0 TO 1000:NEXT AA
440 NEXT A
450 FOR A=6 TO 10
460 CLS
470 A1=RND(16)-1:A2=RND(16)-1
480 IF A1-A2<0 THEN 470
490 PRINT@0,"PROBLEM #"A
500 PRINT@172,B$(A1)
510 PRINT@203,"-"B$(A2)
520 PRINT@235,"-----"
530 B$=""
540 GOSUB 1160
550 ANS$=B$(A1-A2)
560 FOR B=0 TO 15
570 IF B$=B$(B) THEN 580 ELSE NE
XT B
580 IF B=A1-A2 THEN PRINT@267,"R
IGHT":R1=R1+1
590 IF B<>A1-A2 THEN PRINT@267,"
WRONG":W1=W1+1
600 FOR AA=0 TO 1000:NEXT AA
610 NEXT A
620 FOR A=11 TO 15
630 CLS
640 A1=RND(16)-1:A2=RND(16)-1
650 IF A1*A2>15 THEN 640
660 IF A1=0 OR A2=0 THEN 640
670 PRINT@0,"PROBLEM #"A
680 PRINT@172,B$(A1)
690 PRINT@203,"*"B$(A2)
700 PRINT@235,"-----"
710 B$=""
720 GOSUB 1160
730 ANS$=B$(A1*A2)
740 FOR B=0 TO 15
750 IF B$=B$(B) THEN 760 ELSE NE
XT B
760 IF B=A1*A2 THEN PRINT@267,"R
IGHT":R2=R2+1
770 IF B<>A1*A2 THEN PRINT@267,"
WRONG":W2=W2+1
780 FOR AA=0 TO 1000:NEXT AA
790 NEXT A
800 PRINT:PRINT"THE NEXT TEST WI
LL BE TIMED."
810 PRINT"STANDBY FOR 8 BIT NUMB
ERS."
820 AA=16
830 FOR E=1 TO 15
840 FOR A=0 TO 1
850 FOR B=0 TO 1
860 FOR C=0 TO 1
870 FOR D=0 TO 1
880 IF A=1 THEN A$="1" ELSE A$="
0"
890 IF B=1 THEN B$="1" ELSE B$="
0"
```

```
900 IF C=1 THEN C$="1" ELSE C$="
0"
910 IF D=1 THEN D$="1" ELSE D$="
0"
920 B$(AA)=B$(E)+A$+B$+C$+D$
930 AA=AA+1
940 NEXT D,C,B,A,E
950 FOR A=0 TO 15:B$(A)="0000"+B
$(A):NEXT A
960 FOR A=16 TO 20
970 CLS:TT=0
980 A1=RND(256)-1:A2=RND(256)-1
990 IF A1+A2>255 THEN 980
1000 PRINT@0,"PROBLEM #"A
1010 PRINT@170,B$(A1)
1020 PRINT@201,"+"B$(A2)
1030 PRINT@233,"----------"
1040 B$=""
1050 TIMER=0
1060 GOSUB 1280
1070 ANS$=B$(A1+A2)
1080 FOR B=0 TO 255
1090 IF B$=B$(B) THEN 1100 ELSE
NEXT B
1100 IF B=A1+A2 THEN PRINT@265,"
RIGHT":R3=R3+1
1110 IF B<>A1+A2 THEN PRINT@265,
"WRONG":W3=W3+1
1120 PRINT"TIME:"TT"SECONDS."
1130 FOR AA=0 TO 1000:NEXT AA
1140 NEXT A
1150 GOTO 1410
1160 FOR AT=271 TO 268 STEP -1
1170 A$=INKEY$
1180 IF A$=CHR$(9) THEN 1710
1190 PRINT@AT,CHR$(128);
1200 FOR T=0 TO 10:NEXT T
1210 PRINT@AT,CHR$(207);
1220 FOR T=0 TO 10:NEXT T
1230 IF A$="0" OR A$="1" THEN 12
40 ELSE 1170
1240 B$=A$+B$
1250 PRINT@AT,A$;
1260 NEXT AT
1270 RETURN
1280 FOR AT=273 TO 266 STEP -1
1290 A$=INKEY$
1300 IF TIMER>59 THEN TIMER=0:TT
=TT+1
1310 IF A$=CHR$(9) THEN GOTO 176
0
1320 PRINT@AT,CHR$(128);
1330 FOR T=0 TO 10:NEXT T
1340 PRINT@AT,CHR$(207);
1350 FOR T=0 TO 10:NEXT T
1360 IF A$="0" OR A$="1"THEN 137
0 ELSE 1290
1370 B$=A$+B$
1380 PRINT@AT,A$;
1390 NEXT AT
```

```
1400 RETURN
1410 CLS
1420 IF RR=1 THEN PRINT N$
1430 PRINT"EVALUATION"
1440 PRINT"   PROBLEM      NUMBER
  NUMBER"
1450 PRINT"   NUMBER       WRONG
  RIGHT"
1460 PRINT"---------------------
-----------"
1470 PRINT "  1 THRU 5       "W"
   "R
1480 PRINT " 6 THRU 10       "W1"
   "R1
1490 PRINT "11 THRU 15       "W2"
   "R2
1500 PRINT "16 THRU 20       "W3"
   "R3
1510 PRINT:PRINT"YOU GOT"W+W1+W2
+W3"WRONG"
1520 PRINT"OUT OF 20 QUESTIONS F
OR A"
1530 P=((R+R1+R2+R3)/20)*100
1540 PRINT"PERCENTAGE OF"P"%."
1550 IF RR=1 THEN 1610
1560 OPEN"O",#1,LEFT$(N$,8)
1570 WRITE#1,R,R1,R2,R3,W,W1,W2,
W3,N$
1580 CLOSE #1
1590 PRINT"THANK YOU "N$
1600 PRINT"PRESS ANY KEY TO BEGI
N NEW TEST"
1610 IF INKEY$=""THEN 1610 ELSE
1620
1620 IF RR=0 THEN 10
1630 CLS:RR=1
1640 PRINT"NAME OR <E>XIT"
1650 INPUT N$
1660 IF N$="E" THEN 10
1670 OPEN"I",#1,N$
1680 INPUT #1,R,R1,R2,R3,W,W1,W2
,W3,N$
1690 CLOSE #1
1700 GOTO 1410
1710 FOR TA=268 TO 271
1720 PRINT @TA," ";
1730 NEXT TA
1740 B$=""
1750 GOTO 1160
1760 FOR TA=266 TO 273
1770 PRINT@TA," ";
1780 NEXT TA
1790 B$=""
1800 GOTO 1280
```



The LLISTing Formatter

By Clay Howe

Most `LLIST` formatting utilities require that the BASIC program to be `LLIST`ed first be saved as an ASCII file, then read from disk or cassette and output to a printer in the required line lengths. *BestList* uses a machine language routine to handle the `LLIST`ing and is controlled by the user through a BASIC program.

BestList's machine language code is contained in `DATA` lines, which are read in by the program. The user is therefore able to modify the code.

When you run the program, it will determine if the system is disk or cassette and configure itself for the system in use. You are then presented with the main menu and its three options:

1) Set Printer Baud
2) Change Defaults
3) LLIST Program

Pressing 1 brings up another menu, which permits you to set the printer baud rate to 600, 1200, 2400, 4800 or 9600. The default printer baud rate is 9600, so this option may be bypassed if you want to use that rate. After a selection is made, the program returns to the main menu.

Pressing 2 displays the default menu, which shows the current values for the following: column width, indentation, printout length and the lines to skip.

Column width is the number of characters per line that you want your `LLIST`ing to have. It may be changed to any value from 1 to 255. The default value is 80.

Indentation comes into play if a program line is longer than the width you have selected. The second row of the program line will be `LLIST`ed below the first portion of the line, but it will be indented from the left margin the number of spaces you have selected. This value must be greater than or equal to 1. The default is 4, which `LLIST`s only line numbers at the left margin.

Printout length is the number of lines to be printed before a "skip over perforation" is performed. The program is set up to a page length of 66 lines, because most printers print six lines per inch. The printout length may be anything from 1 to 65. The default is 60.

The "Skip Lines" option sets the number of blank lines that will be printed as the program skips over the perforation. It will always equal 66 minus the printout length value. The default is 6.

A note about printout length and skipping lines: Entering a value into either of these options automatically reconfigures the other so that the sum of the two always equals 66. If one is changed, the other will take care of itself. *BestList* will not accept a value of zero for any of the four default options.

Pressing 3 at the main menu displays another screen, which will ask for input concerning the program you want to `LLIST`. If you are using a cassette system, you need only enter the filename and then press ENTER when the tape with the program to be `LLIST`ed is in place and the cassette Play button is pressed. Pressing ENTER at the filename prompt will load the next file on the cassette.

If a disk system is in use, you must enter a filename and extension at the first prompt (enter the extension only if it is other than `.BAS`); otherwise, only the filename is required. Then the number of the drive containing the program to be `LLIST`ed is prompted. Pressing ENTER at that prompt will access Drive 0.

An added feature when using disk is the ability to press ENTER at the filename/extension prompt, followed by the drive number entry at that prompt, and have a disk drive directory pop onscreen. Pressing ENTER after the directory is displayed returns you to the filename/extension prompt.

The program will execute the machine language routine when Option 3 (`LLIST` Program) is selected from the

---

Clay Howe is a self-taught electronic and computer hobbyist. He has developed several hardware modifications for both the CoCo and radio control systems. When he can get away from his CoCo, and weather permits, he enjoys flying RC sailplanes.

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main menu. After the program to be LLISTed is loaded, the normal screen OK prompt will let you know that you may proceed with the normal LLISTing process. When the printer is online and the paper is properly set (a perforation a little above the print head will do), simply type LLIST and press ENTER, and your hard copy will be made using the column width, indentation, printout length and line skip values that were last in effect at the Change Defaults menu.

> ***"The column width, indentation, printout length and line skip defaults may also be easily modified with just a few changes to the program."***

You can use *BestList* without going to any of the configuration menus if all of the defaults match your requirements. Selecting the LLIST option at the main menu causes the program to jump to the READ DATA and initialization routine before it displays the LLIST Program menu. If you select the Change Defaults option, it will also jump to the initialization routine before the default menu appears.

After an LLIST has been made, you can do another with the same defaults by entering EXEC before entering LLIST — this resets the line counter in the machine language routine to zero. If you want to do another LLIST but with different defaults, just load and run the program again. If your CoCo has not been powered down, chances are the machine language routine will still be intact; and an initialization will not be performed at any prompt. You can make any desired default changes and proceed with the next LLISTing.

If, by rare chance, the screen blanks or the CoCo hangs up when trying to do a second LLIST, just turn the machine off for a few seconds, then start over again.

Machine language programs that are normally loaded with the command LOADM or CLOADM cannot be LLISTed using this program.

Whatever drive number you select when loading a program from the LLIST Program menu will become the default drive number until it is changed at that menu, or by entering DRIVEn (n= drive number desired) after an LLISTing is complete.

Customizing the Program

There are several things you can do to the program that will make it easier for you to use if you find that most of your LLISTing is done using the same configuration.

The first change you may want to make is the default printer baud rate. Some popular printers will work only at 600 or 1200 baud. Line 100 sets the baud rate with a poke to memory address 150; in this case a 1 is poked. The poke value is set up as the variable BD. To use another baud rate, just change the 1 in BD=1 to the value for the rate you want to use: 600 baud, BD=87; 1200 baud, BD=41; 2400 baud, BD=18; 4800 baud, BD=7.

The column width, indentation, printout length and line skip defaults may also be easily modified with just a few changes to the program. Any value that you want to change must first be converted from decimal to hexadecimal. For example, if you want the default column width to be 64, you would first convert 64 to Hex by entering on your CoCo the command ?HEX$(64). The screen would display the number 40, which is the Hex equivalent of decimal 64. The 40 would then be edited into the proper DATA position.

The value for column width is the 50 (*Hex*, remember?) at DATA position 4 in Line 530. The value for indentation is the 04 at DATA position 15 in Line 530. The printout length value is the 3C at DATA position 13 in Line 540. The line skip value is the 06 at DATA position 17 in Line 540.

Lines 530 and 540 each contain 18 DATA "positions," from 1 to 18. Reconfigure the *BestList* defaults by inserting the new Hex value at the appropriate DATA line position. Do not use zero when changing any of the default values in the DATA lines.

Program lines 530 and 540 are listed below with the DATA positions indicated:

```
530 DATA 96,9C,81,50,25,13,
86,0D,BD,A2,BF,86,20,C6,04,
BD,A2,BF
540 DATA 5A,26,FA,6C,8D,FF,
CE,A6,8D,FF,CA,81,3C,25,CF,
C6,06,86
```

Don't forget to save the customized version before you proceed with LLISTing. If you don't save it, you'll lose it!

Lines	Description
100-150	set up both numeric and string variables for later use. Line 120 determines if the system is cassette- or disk-based.
500-550	contain the data that is read in by the READ DATA routine and poked into memory. It will then be the machine language LLIST routine.
1000-1090	used for the main menu.
1500-1640	used for the printer baud menu. Line 1610 contains a short string that is converted by a MID$ function to select a baud rate. Be sure that a character (0 is used) preceeds the 87 in the string.
2000-2120	the READ DATA routine. This is where the DATA in lines 500 and 550 are converted to the machine language LLIST routine.
2500-2660	take care of the default menu and any changes you make while using this option. Lines 2620 through 2650 do the actual pokes when changes are made. Note that lines 2640 and 2650 poke two locations to match the printout length to the line skips.
3000-3150	contain the LLIST menu and the routine to get the program you want to LLIST, do a directory and select a drive number if a disk system is being used, or prompt the proper cassette setup for such a system, and load the program to be LLISTed.
3500-3510	the subroutine that waits for a key press and is accessed by almost all of the input prompts.

(Questions or comments about this program may be directed to the author at 310 S. Jefferson St., Sturgis, MI 49091. Please enclose an SASE when writing for a reply.) □

```
530 .......28  2650 .....151
1540 .....193  END .....202
2520 ......61
```

The listing: BESTLIST

```
10 '**************************
20 '**   LLIST FORMATTER    **
30 '**************************
40 '**   BASIC LOADER FOR   **
50 '**      FLIST/BIN       **
60 '** ML CODE BY C.ROSLUND **
70 '** DECEMBER 1982 ISSUE  **
80 '**    OF THE RAINBOW    **
90 '**************************
100 BD=1:POKE150,BD:'** BAUD RAT
E **
110 A$=STRING$(32,188):B$=STRING
$(32,179)
120 DV=PEEK(188):ST=DV*256
130 FORX=ST TO ST+103:POKEX,&HFF
:NEXTX
140 IF DV=6 THEN C$="CASSETTE" E
LSE IF DV=14 THEN C$="  DISK":PO
KE&H95A,0
150 L$="* * * LOADING * * *":L1$
="READY PRINTER-LLIST AT OK PROM
PT"
160 '**************************
500 DATA 6F,8D,00,19,BE,01,68,AF
,8C,11,30,8C,11,BF,01,68,86,7E
510 DATA B7,01,67,86,39,A7,8C,EA
,39,00,00,00,34,17,D6,6F,C1,FE
520 DATA 27,06,35,17,6E,9D,FF,EF
,81,0D,26,06,6C,8D,FF,E9,20,F0
530 DATA 96,9C,81,50,25,13,86,0D
,BD,A2,BF,86,20,C6,04,BD,A2,BF
540 DATA 5A,26,FA,6C,8D,FF,CE,A6
,8D,FF,CA,81,3C,25,CF,C6,06,86
550 DATA 0D,BD,A2,BF,5A,26,F8,6F
,8D,FF,B8,20,BF,XX
560 '**************************
1000 CLS:PRINT:PRINT:PRINTA$;
1010 PRINT"        **** MAIN MENU
****"
1020 PRINTA$;
1030 PRINT:PRINT"         <1> SET P
RINTER BAUD"
1040 PRINT:PRINT"         <2> CHANG
E DEFAULTS"
1050 PRINT:PRINT"         <3> LLIST
```

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```
PROGRAM"
1060 PRINT:PRINTB$;
1070 GOSUB 3500
1080 A=VAL(Q$):IFA<1 OR A>3 THEN
 1000
1090 ON A GOSUB 1500,2500,3000
1100 '***************************
1500 CLS:PRINT:PRINT:PRINTA$;
1510 PRINT"      **** BAUD MENU
****"
1520 PRINTA$;
1530 PRINT:PRINT"          <1> -
 600"
1540 PRINT"         <2> - 1200"
1550 PRINT"         <3> - 2400"
1560 PRINT"         <4> - 4800"
1570 PRINT"         <5> - 9600"
1580 PRINT:PRINTB$;
1590 GOSUB 3500
1600 Q=VAL(Q$):IFQ<1 OR Q>5 THEN
 1500
1610 E$="087411807 01"
1620 BD=VAL(MID$(E$,(Q*2),2))
1630 POKE 150,BD
1640 GOTO 1000
1650 '***************************
2000 CLS:PRINT@128,A$;
2010 PRINT@198,"***** READING **
***"
2020 PRINT@262,"***** D A T A **
***"
2030 PRINT@320,B$;
2040 PRINTTAB(11)C$:PRINTB$;
2050 EN=ST
2060 READ D$
2070 IF D$="XX" THEN 2120
2080 C=VAL("&H"+D$)
2090 POKE EN,C
2100 EN=EN+1
2110 GOTO 2060
2120 RETURN
2130 '***************************
2500 IF PEEK(ST)<>&H6F THEN GOSU
B 2000
2510 CLS:PRINT:PRINT:PRINTA$;
2520 PRINT"     **** DEFAULT MENU
 ****":PRINTA$;
2530 PRINT:PRINT"  <1> - COLUMN
WIDTH ---->"PEEK(ST+57)
2540 PRINT"  <2> - INDENTATION -
---->"PEEK(ST+68)
2550 PRINT"  <3> - PRINTOUT LENG
TH ->"PEEK(ST+84)
2560 PRINT"  <4> - SKIP LINES --
---->"PEEK(ST+88)
2570 PRINT"  <5> - MAIN MENU"
2580 PRINT:PRINTB$;
2590 GOSUB 3500
2600 Q=VAL(Q$):IFQ<1 OR Q>5 THEN
 2510
2610 ON Q GOTO 2620,2630,2640,26
50,1000
2620 PRINT@217,;:INPUTCW:IFCW<1
OR CW>255 THEN2620 ELSE POKEST+5
7,CW:GOTO 2510
2630 PRINT@249,;:INPUTID:IFID<1T
HEN2630 ELSE POKEST+68,ID:GOTO 2
510
2640 PRINT@281,;:INPUTPL:IFPL<1
OR PL>65 THEN2640 ELSE POKEST+84
,PL:POKEST+88,(66-PL):GOTO 2510
2650 PRINT@313,;:INPUTSL:IFSL<1
OR SL>65 THEN2650 ELSE POKEST+88
,SL:POKEST+84,(66-SL):GOTO 2510
2660 RETURN
2670 '***************************
3000 IF PEEK(ST)<>&H6F THEN GOSU
B 2000
3010 CLS:PRINT:PRINT:PRINTA$;
3020 PRINT"      **** LLIST MENU
****":PRINTA$;
3030 IF PEEK(ST)<>&H6F THEN GOSU
B 2000:GOTO 3010
3040 IFDV=14 THEN F1$=" FILENAME
/EXT" ELSE F1$=" FILENAME"
3050 PRINT@384,B$;
3060 PRINT@192,F1$;:INPUTF$
3070 IFDV=14 THEN 3080 ELSE 3130
3080 IF F$="" THEN PRINT@210,"di
rectory":D=1 ELSE D=0
3090 PRINT@224,;:INPUT" DRIVE NU
MBER - ";DN
3100 IF D=1 THEN DRIVEDN:DIR:INP
UT"          PRESS <enter>";Q:GOT
O3010
3110 PRINT@294,L$:PRINTL1$;:PRIN
T@416,;:
3120 EXECST:DRIVEDN:LOAD F$
3130 PRINT@224,;:INPUT" READY CA
SSETTE - <enter>";Q
3140 PRINT@294,L$:PRINTL1$;:PRIN
T@416,;:
3150 EXECST:CLOAD F$
3160 '***************************
3500 Q$=INKEY$:IFQ$=""THEN3500
3510 RETURN
3520 '***************************
3530 '**  BASIC LOADER BY:      **
3540 '**      CLAY HOWE         **
3550 '**  STURGIS, MICHIGAN     **
3560 '**   (616)-651-4248       **
3570 '***************************
3580 '**     NOVEMBER 1985      **
3590 '***************************
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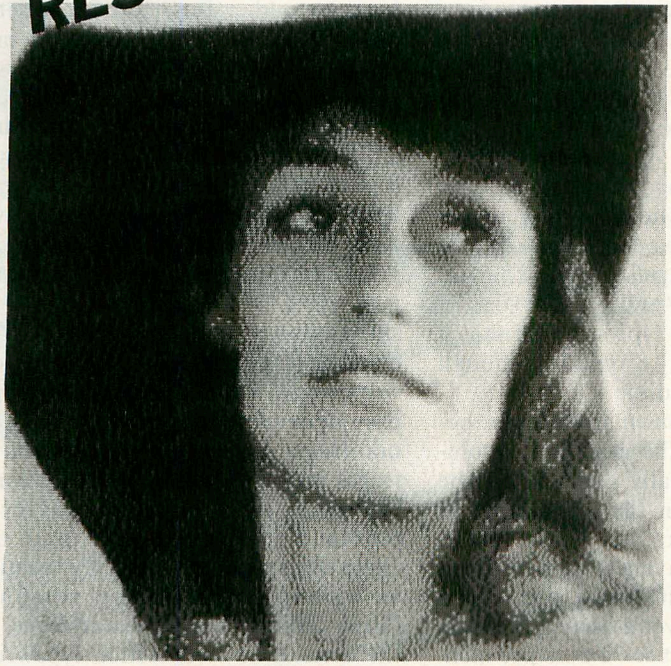

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PRINTER OVERVIEW

By Ed Ellers
Rainbow Technical Editor

You might think the typical RAINBOW reader would have upgraded his or her system to include a 512K CoCo 3, an RGB monitor, a 1200 baud modem and a dot matrix printer, but a lot of our readers are just starting out and haven't worked their way up yet. It is still probably safe to say the typical CoCo user either has a printer, wants to buy one, or wants to upgrade to a better one. Rather than try to give a detailed buyer's guide, this will be an overview of the six basic types of printers (dot matrix, daisy wheel, laser, thermal, ink-jet and pen plotter) that CoCo users might be interested in, with an explanation of common features and what to look for.

Dot Matrix

This is the most popular type of printer among CoCo users, as well as the most common type of printer for personal computers in general. Why? Because it's also the most versatile type of printer; a good dot matrix printer can usually serve all but the most specialized applications you may have for a printer.

Dot matrix impact printers use a series of wires in the print head to transfer the image through an inked ribbon to the paper. This type of printer is versatile because it's not limited to printing a fixed set of characters; it can also print any image that can be converted to a dot pattern. A typical dot matrix printer uses this capability to print both "bit-image" graphics that are fed into the printer and various sizes of type, ranging from type so small that it can barely be read to type big enough for almost any headline.

The most common difference between printers is the available resolution, and that usually depends on the number of wires in the print head. A low-end printer like the Tandy DMP-130 will usually have a nine-wire print head; since the wires in a print head normally extend over a one-eighth inch area, this works out to 72 dots per inch. Resolution can be extended by multiple-pass printing to a typical limit of 216 dpi, though this does tend to slow down the printing process. The high-speed print modes of such a printer typically use a 7-by-9 character set, giving rather coarse "computer-style" type; but the trend in recent years has been to add a two-pass "near letter-quality" mode that provides a more attractive 14-by-18 font. Most nine-wire printers today have this feature.

More expensive printers often have an 18- or 24-wire print head, which gives higher resolution and greater speed than a nine-wire printer. The 18-wire type, such as the Okidata Microline 292, gives the same resolution at full speed as a nine-wire printer would when slowed down; at higher resolutions (288 dpi is practical here) they do slow down somewhat. The 24-wire printers give even better resolution; 360 or 384 dpi is not unheard-of here, and that's starting to get into laser territory. Some corporations are using 24-pin printers for important correspondence, because their character sets aren't so easily identified as having come from a computer. (High-quality carbon film ribbons, like the ones used with office typewriters and daisy wheel printers, are becoming available for dot matrix printers.)

The other new feature that's starting to catch on, though slowly, is color printing. Some of the latest dot matrix printers can use a four-color ribbon

---

Ed Ellers, a RAINBOW and PCM staff member, is a self-confessed electronics fanatic who takes time off to pursue other interests including science fiction.

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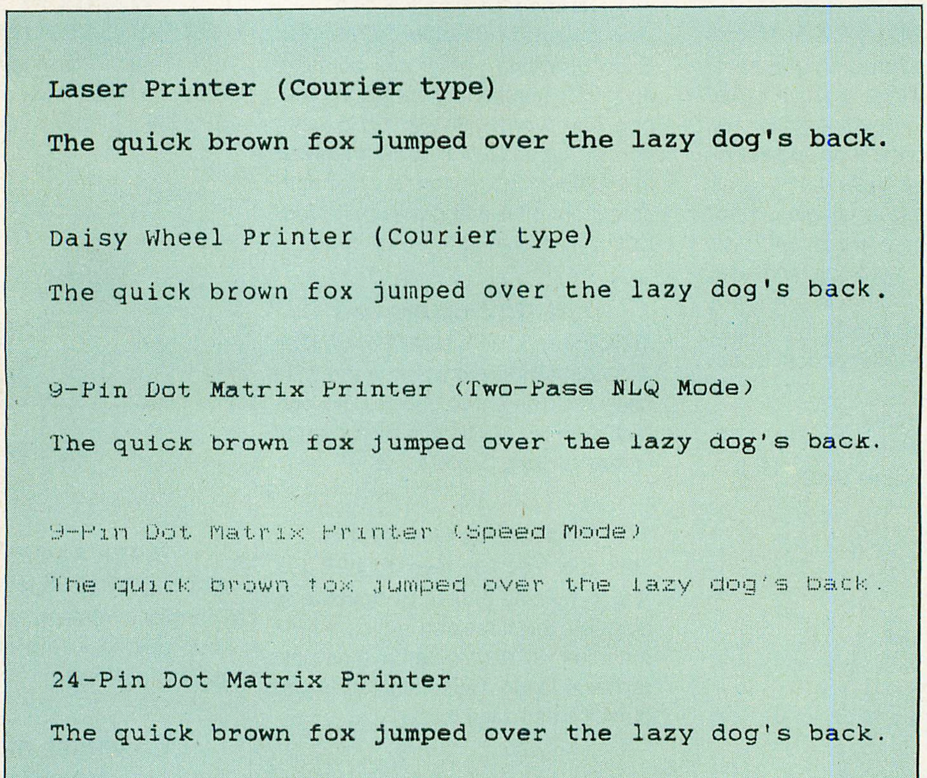
(black, yellow, magenta and cyan) that moves up and down on command. Although this type of printing is fairly slow, requiring four times the number of passes as a straight black-and-white printout, amazingly good results can be obtained. (These printers generally will accept a standard black ribbon that can be used for normal work, so that you don't waste the color ribbon by using up the black portion prematurely.)

As for compatibility, the Epson printer code set is so well accepted these days — even by IBM, whose standard printer codes are similar to those of Epson printers — that almost all dot matrix printers, including the present Tandy line, support either Epson or IBM printer control codes. New CoCo software packages often support Epson printers and compatibles as well, so most of the printers you'll come across should work well with the Color Computer. On the hardware side, most of Tandy's dot matrix printers (all but the most expensive models) do support the CoCo's serial I/O port, though the speed is limited to a typical value of 1200 or 2400 baud. With other brands of printers you'll need either an RS-232 board that mounts inside the printer (and which is only available for some printers) or an external serial-to-parallel converter box, like the ones from Metric Industries and Dayton Associates, that just connects between the CoCo and a parallel printer.



Laser Printer (Courier type)

The quick brown fox jumped over the lazy dog's back.

Daisy Wheel Printer (Courier type)

The quick brown fox jumped over the lazy dog's back.

9-Pin Dot Matrix Printer (Two-Pass NLQ Mode)

The quick brown fox jumped over the lazy dog's back.

9-Pin Dot Matrix Printer (Speed Mode)

The quick brown fox jumped over the lazy dog's back.

24-Pin Dot Matrix Printer

The quick brown fox jumped over the lazy dog's back.

Figure 1

Daisy Wheel

These printers (and some related types, such as the NEC Spinwriter and IBM Selectric) used to be the most common way to obtain letter-quality text, because they print actual characters from a type element rather than bit images. Unfortunately, they tend to be rather slow and noisy, and for that reason (as well as their inability to print graphics images well) they're being steadily replaced by the better dot matrix printers and by laser printers. If you do have a real need for letter-quality type, some daisy wheel printers are selling for under $300 these days; but you might also consider putting the money toward a high-quality dot matrix unit instead.

Laser

Laser printers have become increasingly popular in recent years as a high-quality, highly flexible way of printing text and graphics. These printers combine a scanned laser beam and a copier mechanism, creating a bit image in RAM and then using a solid-state laser to draw that image on the copier drum, which then transfers the image to plain paper in the usual copier fashion. Even though prices have come down somewhat within the past year, they still normally run over $2,000 and would therefore seem to be a bit expensive as an adjunct to a Color Computer system.

Nearly all of the less-expensive laser printers are designed to emulate the Hewlett-Packard LaserJet Plus, although in many cases (Tandy's LP-1000, at $2,199, being one of them) the printer either does not accept HP font cartridges or doesn't use cartridge fonts at all. A number of these printers also emulate either Epson or IBM dot matrix printers (the LP-1000 emulates both the IBM Proprinter and Tandy's dot matrix printers) and can therefore be used reasonably well with the CoCo as long as you can set the printer for the auto line feed mode that the CoCo uses. Some laser printers (such as HP) won't allow this mode change at all, so check the manual before buying.

Thermal

These printers were introduced a number of years ago in an attempt to produce a less expensive type of printer. The original thermal printers required special (and somewhat expensive) paper and produced relatively poor printouts, so they quickly fell from favor as soon as dot matrix printer prices became more competitive. A variation on the basic theme is the thermal transfer printer, which uses a special ribbon to print on plain paper; the Okimate 10 and 20 are examples of this type of printer, which can also be used with thermal paper. The major advantage of thermal transfer printers (aside from somewhat lower cost) is their very low noise level.

Ink-Jet

These printers use a thin jet of ink to draw a bit image on paper. They were originally developed to provide a low-cost way to print multiple-color images (as in the now-discontinued Tandy CGP-220), but most of the ones still on the market, such as the HP ThinkJet, are used in applications where low noise levels are needed, such as in search-and-retrieval systems in libraries.

Pen Plotters

These have long been used in engineering applications to make detailed drawings, but with one exception — the Tandy CGP-115 introduced a few years ago — they haven't made much of a dent in the personal computer market. Their main drawback is the rather poor text they produce, since they "draw" the characters as a series of pen strokes.

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Transferring centered headings to the DMP-110

Center That Header

By Doug Anderson

Centering a heading is easy enough on the video monitor: Just use the `PRINT TAB` or `PRINT@` commands. Transferring a centered heading onto your printer may require more work, however. In this tutorial, you'll get a simple one-line subroutine, plus the necessary background to successfully incorporate this into your own programs.

Unless you are using special fonts (like elongated italics), you can use the following command:

```
PRINT TAB(80-LEN(R$)/2)R$
```

This will work in any case where you are using standard printing (and if your printer has an 80-character line). In other cases, where the length of the line differs, you may need something that looks a little more elaborate (but really isn't):

```
10 R=LEN(R$)
20 S=R*Z
30 T=960-S
40 U=T/2
50 N1=U/256
60 N1=INT(N1)
70 N2=U-(N1*256)
80 PRINT #-2, CHR$(27);CHR$
(26);CHR$(N1);CHR$(N2);R$
```

This really isn't as intimidating as it looks. We'll break it down step by step. First, a word of caution: This works on a CoCo 2 with a DMP-110 printer. If you have other equipment, you'll need to change some of the parameters that appear in this tutorial. We'll explain as we go along.

The first step is to ascertain the total width of the printed line (in dots). For the DMP-110, this is 960 dots. If you have another type of printer, the value may differ. Check your printer manual.

The second step is to determine the width of the character that you will be using. This is the value of `Z` in Line 20. For a DMP-110, a standard character is nine dots wide; italics are 12 dots wide, and elongated characters are twice the usual width (18 for standard print, and 24 for elongated italics). If you will be using only one type font for your headers, just replace `Z` with an appropriate value. Otherwise, specify a value for `Z` within the program.

In this tutorial, `R$` is the line that we want to print on the form we are designing. We want to center `R$`. So, the first step is to find the length of the line (the number of characters). We find this from `10 R=LEN(R$)`.

Next, we want to find the length of `R$` as measured by the number of dots each character will occupy in the line. Let's say that we want to print our heading in elongated italic type. As we learned above, each character in elongated italic is 24 dots wide. Thus, `20 S=R*Z`.

Now, we want to find the total

Doug Anderson is an attorney who loves computers, roses and science fiction.

number of spaces left over on the line after we have printed our string. On the DMP-110, the total length of the line is 960 dots. From Line 20, the value of `S` is the total number of dots our heading will use. Thus, the amount of blank space will be `30 T=960-S`.

To center the string, we want a value that is one-half of the value of `T` derived from Line 30. The next calculation that we need to perform is `40 U=T/2`.

The value of `U` in Line 40 is the amount of space that we need to `TAB` in order to center our header. However, we need to transform this value into two numbers that the printer will recognize. For the DMP-110, the print command is:

```
80 PRINT#-2,CHR$(27);CHR$(16)
;CHR$(N1);CHR$(N2);R$
```

Those of you who are familiar with printer codes will recognize that the first part of the command tells the printer we want to center `R$`. (For the rest of us, it's that part of Line 80 that reads: `PRINT#-2,CHR$(27);CHR$(16);`.

The last half of this command, `CHR$(N1);CHR$(N2);`, is our next concern. This gets a bit complicated, so reread the next couple of paragraphs until you are comfortable with what we are going to do. If you need additional help, check your printer manual, or *How to Use Your Radio Shack Printer*, by William Barden, Jr.

The value `N1` is a multiple of 256. `N2` is the remainder. Together, these values tell the printer how far to `TAB`. We determine the value of `N1` by finding out how many times 256 may be divided into the value of `U` (which we determined in Line 40). This calculation is `50 V=U/256`.

Because `N1` must be an integer, we need Line 60: `60 N1=INT(V)`. `N2` is the remainder. This is the difference between `N1*256` and `U` (the amount of space we want before we start printing `R$`). Therefore, `70 N2=U-(N1*256)`. If it's easier, you might want to think of the `N1/N2` combination as a number expressed in Base 256.

Let's look at these steps again.

```
10 R=LEN(R$): REM THE NUMBER
OF CHARACTERS IN R$
20 S=R*24: REM 24 IS THE
LENGTH OF EACH CHARACTER IN
ELONGATED ITALIC
30 T=960-S: REM THIS IS HOW
MUCH SPACE IS LEFT OVER AFTER
WE PRINT R$
40 U=T/2: REM THIS IS THE
NUMBER OF SPACES BEFORE WE
START PRINTING A CENTERED R$
50 N1=U/256: REM HOW MANY
TIMES CAN 256 BE DIVIDED
INTO U
60 N1=INT(N1): REM N1 HAS TO
BE AN INTEGER
70 N2=U-(N1*256): REM N2 IS
THE REMAINDER
80 PRINT#-2,CHR$(27);CHR$
(16);CHR$(N1);CHR$(N2);R$
```

When we put it all together, it looks like this:

```
100
R=LEN(R$):S=R*Z:T=960-S:U=T/
2:V=U/256:N1=INT(V):N2=U-(N
1*256):PRINT#-2,CHR$(27);
CHR$(16);CHR$(N1);CHR$(N2)
;R$
```

(Questions or comments regarding this tutorial may be directed to the author at 1038 NE 21st St., Apt. 24, Hillsboro, OR 97124. Please enclose an SASE when requesting a reply.)

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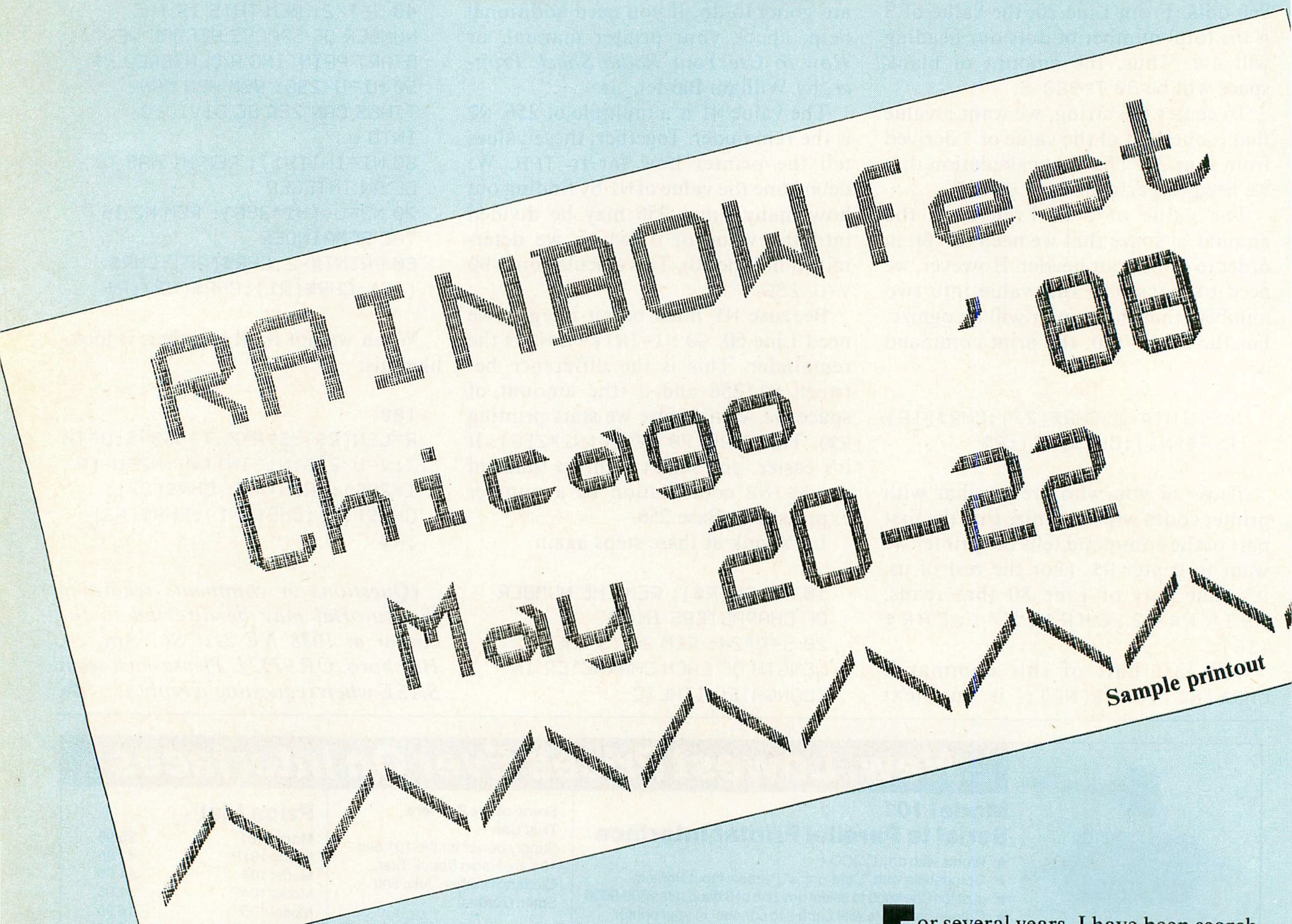
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Sample printout

Bulletin Board Standout

By George Quellhorst

For several years, I have been searching for a Color Computer program to print a neat little bulletin board-type poster as opposed to the many banner printers floating around.

Never once did I have the inclination to write such a program myself, until Radio Shack put the DMP-130 printer on sale, and I saw all those small triangles and squares built into the printer's ROM, the perfect building blocks for alphanumeric characters. The result is this program, which uses the graphics blocks of the DMP-130 to form every keyboard character, except one, to print those little posters.

When the program was first written, it would only work on the Color Computer 3, but I have reworked the program into two parts sharing the same

George Quellhorst lives in Painesville, Ohio, and has had a CoCo since the 4K days. He enjoys writing programs on his two CoCo 2s and a CoCo 3 with RGB monitor.

`DATA` statements and printing routines. One makes use of the 32-column screen and the inverse video of the Color Computer 1 and 2, and the other takes full advantage of the CoCo 3's 40- and 80-column screens with the true lowercase.

The Program

With the exception of the left, right and down arrows, all the keyboard characters are printable, including the SHIFT-CLEAR or reversed slash. The SHIFT-up arrow is used as the only control key in the program.

A total of 98 "blocks," or modules of six graphics characters, were needed to construct all of the characters on the keyboard. The sixth one in each module is `CHR$(224)` or a space. By changing the printer codes, a total of four different character widths, or line lengths, are available. Making the spaces between characters part of each character results in a space between characters that is always proportional to the character being printed. Therefore, the resulting final product will have nice uniform spacing at any character width or line length.

Lines 100 through 112 contain the data for our modules, which are read in the first part of Line 279. After the data is read, we have 98 variables in memory, each containing a group of six graphics characters, `A$(X,Y)`, the last one being `A$(98,6)`.

Lines 150 through 240 hold the `DATA` statements for each one of the 90 characters this program is capable of printing. For example, Line 201 is the capital 'S'. In order to print an 'S', modules 1,14,14,34,15,15,4,11 and 11 have to be printed. The second half of Line 279 puts the variables for each of the 90 characters in memory using the variable `L(X,Y)`, `L(90,9)` being the last one (the lowercase 'z').

The first printable character is the exclamation mark or `CHR$(33)`. The last one is the lowercase 'z' or `CHR$(122)`. By putting the character data in order of their ASCII value, all we have to do is subtract 32 from this in order to be able to read the corresponding `DATA` statement for any given character. We do that in Line 19 of the program.

If we just had to print a single character, this program would be done by now. However, we may have to print up to 22 characters across the width of the paper. In that case we have to print the top module of each of the 22 characters, do a line feed, and go back to print the next row of 22 modules. This process is repeated until all 22 characters on the first line of the poster are printed. If you have trouble visualizing multidimensional arrays, I recommend you check out the program by Robert E. Laun in the April 1987 RAINBOW called "Enter the Fifth Dimension." This will give you a good idea as to how this program works, since we are dealing with a four-dimensional array.

BASIC programming can be a lot of fun, once you teach yourself how to "think" like a computer.

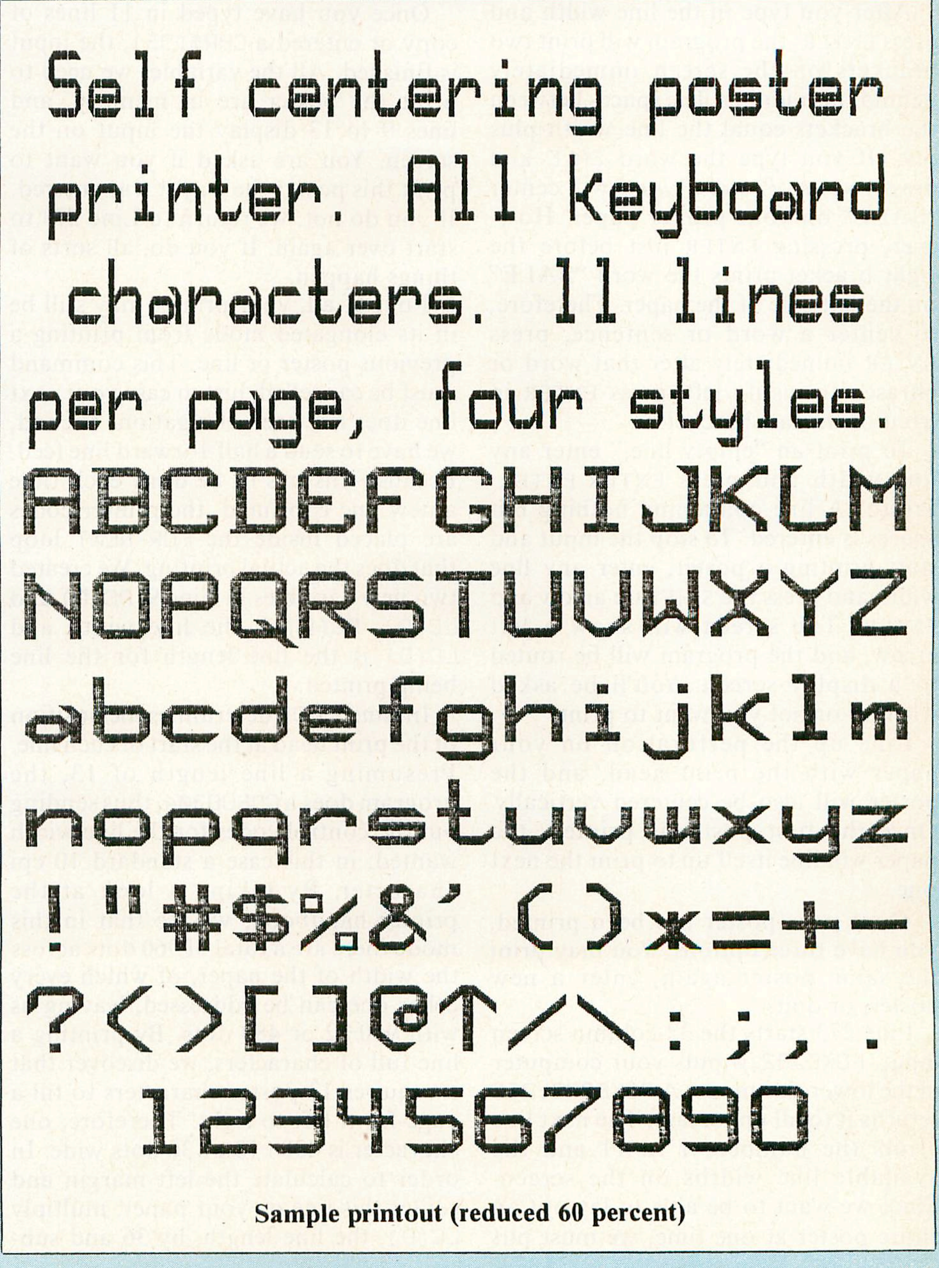
The Input Sections

Up to 11 lines of material may be printed on a single sheet of printer paper, in line widths of 8, 13, 16 and 22 characters per line. The height, however, will remain constant. By changing the printer codes, the width of each character is either elongated or compressed. Therefore, an eight-column character is twice the width of a 16-column character.

When I was working on the input section, it occurred to me that it would be nice if you could design and lay out an entire poster before it was actually printed. On the wide 80-column screen of the CoCo 3, it was easy enough to do. The 32-column screens on the CoCo 1 and 2 were a little harder, however. The layout alone consumes the entire 32-column screen.

Since some of the early model CoCos would not work with the speed-up poke, it is not in effect in the CoCo 1 mode.

The CoCo 3 has to be in the CoCo 2 or 32-column screen mode when the program is run for the first time. The



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per page, four styles.
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NOPQRSTUVWXYZ
abcdefghijklm
nopqrstuvwxyz
! "#$%&' ()*=+-
?<>[]@↑/\:;,.
1234567890

Sample printout (reduced 60 percent)

title screen asks you to press 1, 2 or 3 to indicate which model you have. Depending on the number entered, the program then switches to either a 32- or 80-column input screen.

The input screen displays the numbers 1 through 11 and a cursor immediately behind the number 1. The first thing you must enter is the line width for the first line. Take into consideration what you want to print and how big you want your letters to be. For example, if the first line is a header and all you want to print is "SALE," use the largest character available to make it stand out better. The line width input will not accept anything other than 08, 13, 16 or 22. I wrote it that way since 23, for example, would result in an FC or OD Error, should you try to print your poster. Note that you must enter a leading 0 before the 8.

After you type in the line width and press ENTER, the program will print two brackets on the screen immediately behind this number. The spaces between the brackets equal the line width plus one. If you type the word `SALE` and press ENTER, *Poster Printer* will center "SALE" on your printer paper. However, pressing ENTER just before the right bracket prints the word "SALE" on the left side of the paper. Therefore, to center a word or sentence, press ENTER immediately after that word or phrase. To justify left, press ENTER in front of the last bracket.

To print an "empty line," enter any line width and press ENTER-ENTER. Presto! A line containing nothing but spaces is entered. To stop the input and start printing a poster, enter any line width and press the SHIFT-up arrow and ENTER. The screen will show a left arrow, and the program will be routed to a display screen. You'll be asked whether or not you want to print.

Line up the perforation on your paper with the print head, and the poster will also be centered vertically. Once the first poster is printed, the paper will line itself up to print the next one.

Once your poster has been printed, you have three options. You may print the same poster again, enter a new poster, or quit.

Line 273 starts the 32-column screen input. `POKE282,0` puts your computer in the lowercase mode. A `POKE282,255` returns it to all uppercase. The next line prints the numbers 1 to 11 and the available line widths on the screen. Since we want to be able to lay out an entire poster at one time, we must put all of the inputs inside a `FOR-NEXT` loop in order to assign a variable to each line. Line 274 does that.

Our first input is `B$(F)`, the line width. This is used to calculate the margin in conjunction with the length of the next input, `A$(F)`, which is the actual text for the first line. The last part of Line 275 checks to see if you entered a valid line length. Line 276 makes sure your input is not a `CHR$(95)` or SHIFT-up arrow. If it is, your input is terminated, and the program jumps to Line 278, which restores the uppercase, resets the speed-up poke and creates a flag, `CT=1`, to let the program know that it is in the CoCo 2 mode. If `A$(F)<>CHR$(95)`, then `S=S+32:NEXTF` adds 32 to `S`, the next input's printout location, and routes the program back to get the second line of the poster we are creating.

Once you have typed in 11 lines of copy or entered a `CHR$(95)`, the input is finished. All the variables we need to print the poster are in memory, and lines 9 to 13 display the input on the screen. You are asked if you want to print this poster the way it was entered. If you do not, we return to Line 273 to start over again. If you do, all sorts of things happen.

First of all, your printer may still be in its elongated mode from printing a previous poster or line. This command must be cancelled, just in case your next line does not need elongation. Second, we have to send a half-forward line feed. Because this has to be done each time a new line is printed, the printer codes are placed inside the `FOR-NEXT` loop that does the actual printing. We created two new variables in Line 9, `PC(D)` and `LC(D)`. `PC(D)` is the line width and `LC(D)` is the line length for the line being printed.

In Line 15, `DQ` determines the position of the print head at the start of each line. Presuming a line length of 13, the program does a `GOSUB304`, thus sending out the control codes for the line width wanted, in this case a standard 10 cpi character. By taking a look at the printer handbook, we see that in this mode there are a total of 960 dots across the width of the paper, of which every other one can be addressed, leaving us with 960÷2 or 480 dots. By printing a line full of characters, we discover that it requires 13 poster characters to fill a page from left to right. Therefore, one character is 480÷13 or 36 dots wide. In order to calculate the left margin and center this line on your paper, multiply `LC(D)`, the line length, by 36 and subtract the result from 480. After this is divided by 2, we have our variable `DP`, which will determine the start position of the print head when we return to Line 16.

Even though we have sent the start position of the print head to the printer, there are still a few things left to check before we can start with the actual printing of the first line. The program comes back to this same place every time a new line needs to be printed. Therefore, we must first make sure that there is something left to be printed.

`A$(D)`, our line to be printed, is checked in Line 17. If `A$(D)=""`, we are dealing with an empty line. `FORI=1TO11:PRINT#-2:NEXTI` takes care of that chore and the `NEXTD` in Line 23 routes us back for the next line.

Remember that `CHR$(95)` or SHIFT-up arrow in the input section? Well, Line 18 checks for that and stops the printing in case `A$(D)` happens to be `CHR$(95)`. This line also checks the value of `CT`, our flag that lets the program know what kind of computer you have. If `CT=1`, the program goes to Line 28, and if `CT=0`, it jumps to Line 24. In both cases, you'll have the three end options discussed earlier.

Printing the Poster

Lines 19 through 23 are the soul of *Poster Printer* because your entire poster is being printed in these four lines.

First of all, we should look at all the variables we told the computer to remember. Line 279, `A(X,Y)`, the first thing read into the memory of our machine, holds the graphics used to construct characters. Since `X=1TO98` and `Y=1TO6`, `A(1, 1 through 6)` will contain a block of six graphics characters. Ninty-eight such blocks are now in memory with the very last of these being `A(98, 1 through 6)`, for a grand total of 98 x 6 or 588 separate graphics `DATA` statements.

Secondly, we have `L(X,Y)` containing the data for each one of the 90 characters this program is capable of printing. After this second `READ` statement, we also have `L1` through `L90` in memory, each holding nine-character `DATA` statements, `L(1, 1 through 9)` being the first character, the exclamation point and `L(90, 1 through 9)` being the last one, the lowercase 'z'. Thus, a total of 90 x 9 or 810 `DATA` statements.

If that were not enough, we also have cramped the entire poster in our poor computer's memory. The poster is

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stored in A$ (1 through 11) where A$(1) is the first line of our copy, and A$(11) the last line. Now that all that stuff is loaded and stored in variables, we can bring it together and tell the computer to print our poster.

Because a single poster may contain up to 11 lines of copy, we use the first FOR-NEXT loop in Line 14, FORD=1TO11, to hold those lines. Then we open another FOR-NEXT loop inside the previous one for the nine lines of data each printed line requires, FORT=1TO9 in Line 16. Because this is the start of each of the nine lines of graphics data, the command that positions the print head is inserted next. FORQ=1TOLEN(A$(D)), which is the third loop, simply states FOR Q=1 TO (the length of this line). The last one, FORY=1TO6, is for the six blocks of graphics that make up the modules we constructed earlier.

If we put all those loops within loops together, it would look like this: FORD=1TO11:FORT=1TO9:FORQ=1TOLEN(A$(D)):FORY=1TO6:NEXTY:NEXTQ:NEXTT:NEXTD. As you may know, FOR-NEXT loops within FOR-NEXT loops are executed in reverse order. In our case, the computer will first count all the Ys, then the Qs, followed by the Ts, and finally the Ds.

Now we have all the information necessary to tell the computer what to print. Presuming the first line of our poster reads "SALE," the following occurs: Y=1, Q=1, T=1 and D=1. Since D is still equal to 1, A$(D) is really A$(1), in this case the word "SALE." If we take a look at Line 19, we see that V is the ASCII value of the first character in A$(D)-32. V, therefore, is the ASCII value of S-32 or (83-32)=51. The next time around, Q will be 2 and V will equal the ASCII value of MID$(A$(D),2,1) or the second letter, the 'A'.

Line 20 does the actual printing: PRINT#-2,CHR$(A(L(V,T),Y));. We have two arrays in memory containing data, the A array, which holds the data for the graphic characters, while the L array holds the data needed to print each keyboard character. The data we want to send to the printer is held within the A array. The value of V is like a pointer telling the A array which data to print. Since the character data is arranged in ascending order according to their ASCII value, and V equals 51, the 51st line in those DATA statements contains the information we need to print the letter 'S'. Remember all our variables in the FOR-NEXT loops are still one. L(51,T) is therefore the first number in that line, which is in this case a 1 (the data for the 'S' is in Line 201).

Now let's take another look at Line 20, replacing the L(V,T) in our mind with the number 1. The result is PRINT#-2,CHR$(A(1),Y). Here again, Y still equals one, thus CHR$ A(1,1), which just happens to be the first DATA statement in the graphics data, is dumped to the printer.

NEXTY will print the remainder of the graphics blocks needed to print the top of the 'S'. After all the Ys are printed, we start with the Qs. Since Q is now 2, V will equal the ASCII value of the A. This continues until the whole top row of the word "SALE" has been printed and Q is equal to the length of A$(D). As you know, we are using a 9-by-6 matrix; therefore, it will take nine passes to print "SALE." NEXTT finishes printing the rest of our first line. NEXTD starts the whole thing all over again and prints lines 2, 3, 4, etc.

I would like to mention one more thing. Look at Line 19: IFV=0THEN PRINT#-2:CHR$(32):GOTO 21. Because we subtract 32 from the ASCII value of our character, V will equal 0 only when the ASCII value of the character is 32 or a space. In this case, we have to print six "blocks" of spaces rather than graphics characters. The PRINT#-2,CHR$(32) does just that; and since we GOTO 21 or NEXTY, six spaces will be printed, which is the exact width of a character.

Finally, if you look through the DATA statements, you will see two lines containing nothing but 0s. They are CHR$(95) and CHR$(96). One is the SHIFT-up arrow, which we use as our only control key. And the last one is the underline, which would be a printable character except that it is not a keyboard character; therefore, it cannot be used because there is no keyboard key that sends a CHR$(95) to the printer. The 0s were needed to keep the count of V in line. Lines 300 to 307 are the printer code GOSUBs. You will notice a single- and double-strike line for each line width. You may change the line numbers in Line 15 to print your poster in the double-strike mode.

If you don't have an RGB monitor, change the PALETTERGB in Line 254 to PALETTECMP.

(Questions or comments regarding this program may be directed to the author at 63 South State Street, Painesville, OH 44077. Please enclose an SASE when writing for a response.) ☐

10	216	209	205
20	141	225	229
30	55	250	215
104	69	256	228
109	71	265	200
150	117	277	113
167	132	END	113
183	245		

The listing: POSTRPTR

```
 1 PCLEAR1:CLEAR2000:DIMA(98,6),L
(90,9),A$(11),B$(11),PC(11),LC(1
1)
 2 POKE150,18:GOSUB250:Z$=STRING$
(30,32)
 3 CLS:LOCATE9,0:ATTR3,2:PRINT"PR
INT THIS <";:ATTR3,2,B:PRINT"Y";
:ATTR3,2:PRINT"> OR <";:ATTR3,2,
B:PRINT"N";:ATTR3,2:PRINT">O";:A
TTR1,0:LOCATE38,0
 4 FORD=1TO11:PC(D)=VAL(B$(D)):LC
(D)=LEN(A$(D)):IFPC(D)=8THENB$(D
)="08"
 5 D$=STR$(D):IFVAL(D$)<=9THEND$=
"0"+RIGHT$(D$,1)ELSED$=RIGHT$(D$
,2)
 6 K$="Line:"+D$+".("+B$(D)+"): "
+A$(D):LOCATE2,(D*2):ATTR0,0:PRI
NTK$:NEXTD:ATTR1,0:LOCATE38,22
 7 ATTR0,0:P$=INKEY$:IFP$="Y"THEN
8ELSEIFP$="N"THEN256ELSE7
 8 PRINT#-2:PRINT#-2:LOCATE8,0:PR
INTZ$:LOCATE8,0:ATTR3,2,B:PRINT"
N O W   P R I N T I N G";:ATTR1,
0:LOCATE38,0:ATTR1,0:GOTO14
9 S=64:CLS:PRINT@4,"PRINT THIS <
Y>ES OR <N>0":PRINT@32,STRING$(3
2,45);:FORD=1TO11:PC(D)=VAL(B$(D
)):LC(D)=LEN(A$(D)):IFPC(D)=8THE
NB$(D)="08"
10 D$=STR$(D):IFVAL(D$)<=9THEND$
="0"+RIGHT$(D$,1)ELSED$=RIGHT$(D
$,2)
11 S=S+32:PRINT@S,D$;".(";B$(D);
"):";A$(D):NEXTD
12 P$=INKEY$:IFP$="Y"THEN13ELSEI
FP$="N"THEN273ELSE12
13 PRINT#-2:PRINT#-2:PRINT@4,"N
O W    P R I N T I N G";
14 FORD=1TO11:PRINT#-2,CHR$(27);
CHR$(28);CHR$(27);CHR$(15);CHR$(
27);CHR$(85);CHR$(0);
15 DQ=0:IFPC(D)=8THENGOSUB302ELS
EIFPC(D)=13THENGOSUB304ELSEIFPC(
D)=16THENGOSUB306ELSEIFPC(D)=22T
HENGOSUB307
16 FORT=1TO9:PRINT#-2,CHR$(27);C
HR$(16);CHR$(DQ);CHR$(DP);:FORQ=
1TOLEN(A$(D)):FORY=1TO6
17 IFA$(D)=""THENFORI=1TO11:PRIN
T#-2:NEXTI:GOTO23
18 IFA$(D)=CHR$(95)ANDCT=1THEN28
ELSEIFA$(D)=CHR$(95)ANDCT=0THEN2
4
19 V=ASC(MID$(A$(D),Q,1))-32:IF
V=0 THEN PRINT#-2,CHR$(32);:GOTO
21
20 PRINT#-2,CHR$(A(L(V,T),Y));
21 NEXTY:NEXTQ
22 PRINT#-2:NEXTT:PRINT#-2:PRINT
#-2
23 NEXTD:FORT=1TO9:PRINT#-2:NEXT
:CLS:FORT=1TO10:SOUND180,1:NEXTT
:IFCT=1THEN28ELSE24
24 CLS:LOCATE5,3:ATTR3,2:PRINT"Y
OU HAVE THE FOLLOWING OPTIONS";:
ATTR1,0:LOCATE38,0
25 LOCATE9,8:ATTR0,0:PRINT"1. PR
INT ANOTHER COPY":LOCATE9,10:PRI
NT"2. START A NEW POSTER":LOCATE
9,12:PRINT"3. QUIT":LOCATE9,16:A
TTR3,2,B:PRINT"PRESS NUMBER DESI
RED";:ATTR1,0:LOCATE38,16
26 ATTR0,0:P$=INKEY$:IFP$=""THEN
26ELSEP=INSTR(1,"123",P$):CLS:IF
P=1THEN3ELSEIFP=2THEN27ELSEIFP=3
THENWIDTH32:ENDELSE26
27 FORT=1TO11:FORM=1TO11:A$(M)="
":B$(M)="":NEXTM:GOTO256
28 WIDTH32:PRINT@33,"YOU HAVE TH
E FOLLOWING OPTIONS":PRINT@64,ST
```

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```
RING$(32,42);:PRINT@165,"1. PRIN
T ANOTHER COPY":PRINT@229,"2. ST
ART A NEW POSTER":PRINT@293,"3.
QUIT"
29 P$=INKEY$:IFP$=""THEN29ELSEP=
INSTR(1,"123",P$):CLS:IFP=1THEN9
ELSEIFP=2THEN30ELSEIFP=3THENENDE
LSEEND
30 FORM=1TO11:A$(M)="":B$(M)="":
NEXTM:GOTO273
100 ' Graphics blocks data
101 DATA 252,239,239,239,254,224
,236,239,239,239,254,224,239,224
,224,224,239,224,253,239,239,239
,251,224,224,224,224,253,239,224
,239,251,224,224,224,224,239,239
,239,239,239,224,234,233,224,224
,239,224
102 DATA 239,239,239,224,224,224
,239,224,224,239,239,224,224,224
,224,224,224,224,224,224,239,224
,224,224,238,239,239,239,251,224
,239,224,224,224,224,224,224,224
,224,224,239,224,254,224,224,224
,239,224
103 DATA 234,239,239,239,239,224
,239,224,224,252,239,224,239,224
,252,251,224,224,239,252,251,224
,224,224,239,239,254,224,224,224
,239,224,253,254,224,224,239,224
,224,253,254,224,239,254,224,252
,239,224
104 DATA 239,253,239,251,239,224
,239,224,239,224,239,224,239,254
,224,224,239,224,239,253,254,224
,239,224,239,224,253,254,239,224
,239,224,224,253,239,224,239,239
,239,239,251,224,224,224,224,224
,253,254
105 DATA 253,239,239,239,239,224
,253,239,239,239,254,224,253,254
,224,252,251,224,224,253,239,251
,224,224,239,254,239,252,239,224
,224,252,239,254,224,224,252,251
,224,253,254,224,224,224,224,252
,251,224
106 DATA 224,224,252,251,224,224
,224,252,251,224,224,224,252,251
,224,224,224,224,252,239,239,239
,239,224,239,239,239,239,254,224
,224,224,252,239,239,224,224,239
,239,239,224,224,224,239,239,224
,224,224
107 DATA 252,251,253,254,224,224
,239,252,239,239,254,224,239,251
,224,224,239,224,239,251,239,224
,239,224,239,232,232,232,232,224
,231,231,231,231,239,224,252,239
,239,254,239,224,239,224,224,239
,239,224
108 DATA 253,239,239,251,239,224
,224,224,224,253,254,224,239,232
,232,232,239,224,239,231,231,231
,231,224,224,239,224,224,252,224
,224,253,239,239,251,224,224,239
,224,224,224,224,239,224,239,252
,239,224
109 DATA 224,224,224,239,224,224
,254,224,224,239,224,224,253,239
,239,251,224,224,224,239,224,239
,224,224,239,224,239,224,224,224
,224,224,239,224,239,224,235,236
,224,224,252,224,237,238,224,252
,251,224
110 DATA 252,251,224,235,236,224
,251,224,224,237,238,224,239,224
,224,252,253,224,224,224,252,239
,224,224,224,224,253,239,224,224
,224,253,254,224,224,224,224,239
,254,224,224,224,224,224,253,254
,224,224
111 DATA 224,239,251,224,224,224
,253,254,239,252,251,224,252,251
,239,253,254,224,224,224,224,224
,252,224,251,224,224,224,224,224
,252,239,239,239,251,224,239,224
,224,239,224,224,239,224,252,239
,239,224
112 DATA 239,224,253,239,251,224
,253,254,224,224,224,224,251,224
,224,252,251,224,251,224,239,224
,253,224,254,224,224,224,252,224
,251,224,224,224,253,224,239,251
,224,253,239,224,239,252,239,254
,239,224,254,224,224,224,224,224
,224,224,224,224,253,224
150 ' Characters data
151 DATA 12,12,12,12,12,11,12,11
,11
152 DATA 68,68,68,11,11,11,11,11
,11
153 DATA 68,68,7,68,7,68,68,11,1
1
154 DATA 12,1,69,34,70,4,12,11,1
1
155 DATA 11,71,72,41,42,73,74,11
,11
156 DATA 38,68,36,38,39,75,67,11
,11
157 DATA 63,43,11,11,11,11,11,11
,11
158 DATA 76,42,63,63,63,78,77,11
,11
159 DATA 79,80,65,65,65,41,81,11
,11
160 DATA 11,11,11,82,36,38,83,11
,11
161 DATA 11,11,12,12,7,12,12,11,
11
162 DATA 11,11,11,11,11,11,63,43
,11
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165 DATA 11,84,40,41,42,43,85,11
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166 DATA 1,3,3,3,3,3,4,11,11
167 DATA 48,12,12,12,12,12,47,11
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169 DATA 1,15,15,17,15,15,4,11,1
1
170 DATA 87,87,87,33,65,65,65,11
,11
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1
172 DATA 1,14,14,45,3,3,4,11,11
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175 DATA 1,3,3,33,15,15,4,11,11
176 DATA 11,11,11,12,11,11,12,11
,11
177 DATA 11,11,11,12,11,11,12,42
,11
178 DATA 40,41,42,63,78,80,58,11
,11
179 DATA 11,11,11,7,11,11,7,11,1
1
180 DATA 78,80,58,15,40,41,42,11
,11
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1
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1
183 DATA 1,3,3,7,3,3,3,11,11
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185 DATA 1,3,14,14,14,3,4,11,11
186 DATA 2,8,8,8,8,8,13,11,11
187 DATA 1,3,14,9,14,3,4,11,11
188 DATA 1,3,14,9,14,14,14,11,11
189 DATA 1,3,14,14,10,3,4,11,11
190 DATA 3,3,3,7,3,3,3,11,11
191 DATA 47,12,12,12,12,12,47,11
,11
192 DATA 5,15,15,15,16,3,4,11,11
193 DATA 18,19,20,21,22,23,3,11,
11
194 DATA 6,14,14,14,14,3,4,11,11
195 DATA 93,24,25,26,3,3,3,11,11
196 DATA 3,27,28,29,30,3,3,11,11
197 DATA 1,3,3,3,3,3,4,11,11
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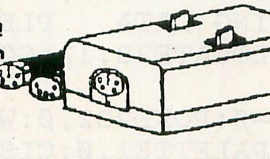

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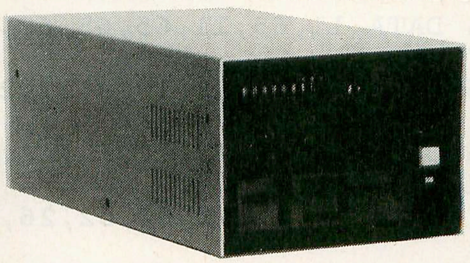

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198 DATA 1,3,3,31,14,14,14,11,11
199 DATA 1,3,3,3,3,29,33,32,11
200 DATA 1,3,3,31,22,23,3,11,11
201 DATA 1,14,14,34,15,15,4,11,1
1
202 DATA 7,12,12,12,12,12,12,11,
11
203 DATA 3,3,3,3,3,3,4,11,11
204 DATA 3,3,3,3,3,35,36,11,11
205 DATA 3,3,3,26,96,95,94,11,11
206 DATA 3,35,36,12,38,39,3,11,1
1
207 DATA 93,35,36,12,12,12,12,11
,11
208 DATA 7,40,41,42,43,14,7,11,1
1
209 DATA 47,63,63,63,63,63,47,11
,11
210 DATA 11,97,90,78,80,58,98,11
,11
211 DATA 47,65,65,65,65,65,47,11
,11
212 DATA 38,83,92,12,12,12,12,11
,11
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214 DATA 0,0,0,0,0,0,0,0,0
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,11
216 DATA 14,14,14,45,3,3,4,11,11
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218 DATA 15,15,15,44,3,3,4,11,11
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221 DATA 11,11,11,1,3,3,33,15,4
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1
223 DATA 11,12,11,48,12,12,47,11
,11
224 DATA 11,65,11,65,65,65,65,66
,67
225 DATA 14,14,18,19,9,22,23,11,
11
226 DATA 48,12,12,12,12,12,47,11
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,11
228 DATA 11,11,11,50,51,3,3,11,1
1
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233 DATA 11,11,11,1,53,54,4,11,1
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234 DATA 63,63,63,9,63,61,62,11,
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1
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1
237 DATA 11,11,11,26,26,64,57,11
,11
238 DATA 11,11,11,35,36,38,39,11
,11
239 DATA 11,11,11,3,3,18,57,15,6
2
240 DATA 11,11,11,31,41,42,44,11
,11
250 CLS3:PRINT@0," BULLETIN BOAR
D POSTER PRINTER":PRINT@32,STRIN
G$(32,42);:PRINT@102,"FOR COLOR
COMPUTERS";:PRINT@134,"   I - II
 - III    ";:PRINT@166,"AND DMP-
130 PRINTER";:PRINT@229,"BY: GEO
RGE QUELLHORST";
251 PRINT@288,"INDICATE WHICH CO
MPUTER YOU HAVE":PRINT@325,"  PR
ESS <1> <2> <3>  ":PRINT@384,"IF
 YOUR MACHINE DOES NOT OPERATE";
:PRINT@416,"WITH THE SPEED-UP PO
KE,(65495,0)":PRINT@455,"YOU MUS
T PRESS <1>"
252 P$=INKEY$:IFP$=""THEN252ELSE
IFP$="1"THENCLS:GOTO253ELSEIFP$=
"2"THENCLS:GOTO254ELSEIFP$="3"TH
ENCLS:GOTO255ELSE252
253 PRINT@259,"LOADING DATA  PLE
ASE WAIT":GOSUB279:GOTO273
254 POKE65495,0:PRINT@259,"LOADI
NG DATA  PLEASE WAIT":GOSUB279:G
OTO273
255 POKE65497,0:WIDTH40:PALETTER
GB:CLS1:LOCATE7,12:ATTR0,0:PRINT
"LOADING DATA   PLEASE WAIT":ATT
R1,0:LOCATE38,12:GOSUB279:GOTO25
6
256 G=0:POKE282,0:WIDTH80:PALETT
ERGB:PALETTE1,0:CLS2:LOCATE11,0:
ATTR3,2:PRINT"S E L F   C E N T
 E R I N G   P O S T E R   P R
 I N T E R";:ATTR2,1:LOCATE78,0:
ATTR3,1
257 FORF=2TO12STEP2:G=G+1:LOCATE
5,F:PRINTG;:H=G+6:IFH=12THEN258E
LSELOCATE40,F:PRINTH:NEXTF
258 LOCATE3,15:ATTR3,2:PRINT"
Input the amount of characters f
or line number one and press ENT
ER.    ";:ATTR3,1
259 LOCATE3,16:ATTR3,2:PRINT"The
 following line lengths are avai
lable: < 8 > - < 13 > - < 16 > -
 < 22 >";:ATTR3,1
260 LOCATE3,17:ATTR3,2:PRINT"You
```

```
 must stay within the [brackets
]. Press ENTER before the last b
racket.";:ATTR3,1
261 LOCATE8,19:ATTR3,3:PRINT"Pre
ss ENTER immediatly after the me
ssage to center your message.";:
ATTR3,1
262 LOCATE8,20:ATTR3,3:PRINT"
Press ENTER just before the last
 bracket to left justify.     ";:
ATTR3,1
263 LOCATE10,22:ATTR3,2:PRINT"EN
TER ANY LINE LENGTH AND PRESS EN
TER-ENTER FOR AN EMPTY LINE.";:A
TTR3,1
264 LOCATE10,23:ATTR3,2:PRINT"
 ENTER ANY LINE LENGHT AND SHIFT
/UP - ENTER TO QUIT INPUT    ";:A
TTR3,1
265 ATTR3,1:G=1:B=9:C=13:FORF=2T
O12STEP2:GOTO267
266 G=7:FORF=2TO12STEP2
267 LOCATEB,F:LINEINPUT"";B$(G):
IFG<6THENLOCATE40,F:IFG+6<12THEN
PRINTG+6
268 A=VAL(B$(G)):IFA<>8 ANDA<>13
 ANDA<>16 ANDA<>22 THENLOCATEB,F
:PRINTSTRING$(25,32);:GOTO267
269 A=A+C:LOCATEA,F:PRINT"]";:LO
CATEB+2,F:PRINT"[";:LINEINPUT"";
A$(G):IFA$(G)=CHR$(95)THEN272ELS
ELOCATEA,F:PRINT"]":IFG+6<12THEN
LOCATE40,F:PRINTG+6
270 G=G+1:IFG=12THEN272ELSENEXTF
271 B=B+35:C=48:GOTO266
272 PALETTERGB:WIDTH40:CLS1:ATTR
0,0:POKE282,255:POKE65496,0:GOTO
3
273 CLS:POKE282,0:PRINT@1,"SELF
CENTERING POSTER PRINTER":PRINT@
32,STRING$(32,42);
274 S=96:FORF=1TO11:PRINT@S,F:S=
S+32:NEXTF:PRINT@481,"LINE WIDTH
S ARE: [8-13-16-22]";:S=100:FORF
=1TO11
275 PRINT@S,"";:LINEINPUT"";B$(F
):A=VAL(B$(F)):IFA<>8ANDA<>13AND
A<>16ANDA<>22THENPRINT@S,STRING$
(25,32):GOTO275ELSEPRINT@S+2,"["
276 A=(A+S+4):PRINT@A,"]";:PRINT
@S+3,"";:LINEINPUT"";A$(F):IFA$(
F)=CHR$(95)THEN278ELSEPRINT@A,"]
"
277 S=S+32:NEXTF
278 POKE282,255:POKE65494,0:CT=1
:GOTO9
279 FORX=1TO98:FORY=1TO6:READ A(
X,Y):NEXT:NEXT:FORX=1TO90:FORY=1
TO9:READL(X,Y):NEXT:NEXT:RETURN
300 'Printer codes gosubs
301 PRINT#-2,CHR$(27);CHR$(29);C
HR$(27);CHR$(14);:DP=INT((576-(L
C(D)*72))/2):RETURN' 8 Character
s double strike.
302 PRINT#-2,CHR$(27);CHR$(23);C
HR$(27);CHR$(14);:DP=INT((576-(L
C(D)*72))/2):RETURN' 8 Character
s single strike
303 PRINT#-2,CHR$(27);CHR$(18);:
DP=INT((480-(LC(D)*36))/2):RETUR
N' 13 Double st.
304 PRINT#-2,CHR$(27);CHR$(19);:
DP=INT((480-(LC(D)*36))/2):RETUR
N' 13 Single st.
305 PRINT#-2,CHR$(27);CHR$(29);:
DP=INT((576-(LC(D)*36))/2):IFDP>
255THENDQ=1:DP=DP-255:RETURNELSE
RETURN' 16 Double str.
306 PRINT#-2,CHR$(27);CHR$(23);:
DP=INT((576-(LC(D)*36))/2):IFDP>
255THENDQ=1:DP=DP-255:RETURNELSE
RETURN'16 Single st.
307 PRINT#-2,CHR$(27);CHR$(23);C
HR$(27);CHR$(20);:DP=INT((960-(L
C(D)*42))/2):IFDP>255THENDQ=1:DP
=DP-255:RETURNELSERETURN
```

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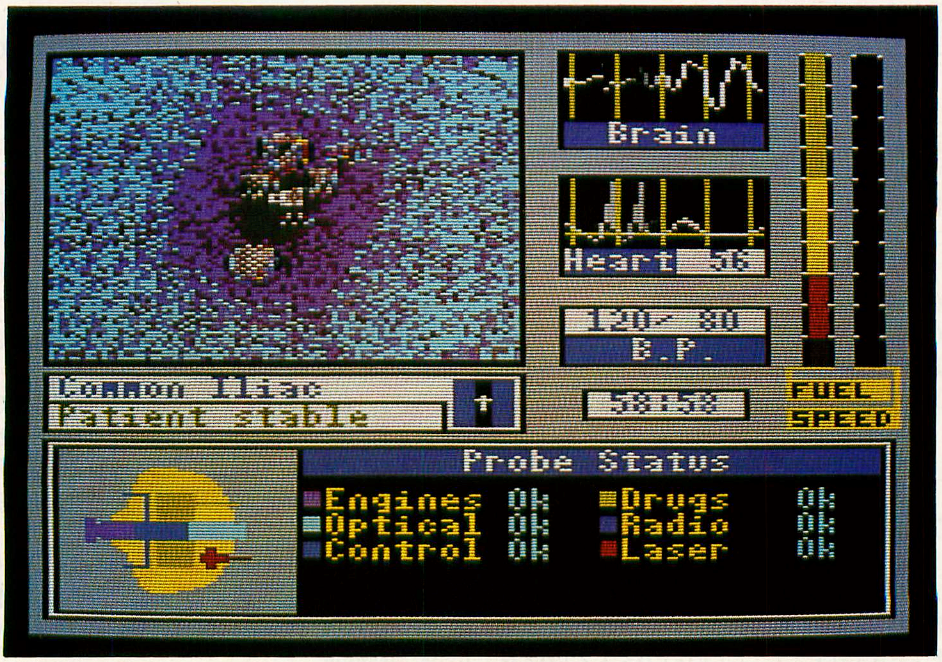


Common Iliac
Patient stable

Probe Status

Engines	Ok	Drugs	Ok
Optical	Ok	Radio	Ok
Control	Ok	Laser	Ok

Software CoCo 3

Laser Surgeon: The Microscopic Mission — The Cutting Edge

"Cardiac arrest, doctor!"

"Bicarb! EPI! Defibrillate — 20 watt/seconds! Joystick!"

"Joystick?"

Absolutely! Pass the joystick, open your mind, and prepare to think, learn, and be entertained at a furious pace. As a cardiovascular physiologist, I always knew that medicine and anatomy were fun. There were a few problems, however, in convincing anyone else that this was, indeed, the case. With the programming wizardry of Mark Easter and Greg Zumwalt, and the medical expertise of Robert Clardy and Alan Zalta, M.D., *Microscopic Mission* should go a long way toward changing this perception. The CoCo 3 is making a house call.

Bearing in mind that one is working within the limitations of a computer-simulated environment, *Microscopic Mission* proceeds with a startling aura of reality. Each player begins his "rotation" as a medical trainee sorely in need of polishing his or her medical skills. In view of this fact, the program assigns cases based on the recorded skill level of each player, a strategy that encourages inquisitive would-be doctors to continue to play, sharpening their skills even further. As these skills are dependent on real-life medical knowledge, including anatomy, physiology, etiology (the study of the causes and origins of illness) and the treatment of human disease, the potential for learning is truly phenomenal.

The game begins with the assignment of a life-threatening case (patient) requiring successful microsurgical treatment within a specified period of time. Pertinent facts about the patient are displayed on a replica of a hospital chart. Details about the injury, lifestyle (smoker/non-smoker, alcohol use), allergies to medications and any other medical information vital to the case are contained on the patient's chart.

"Doctors" would be well-advised to follow the suggestions provided in the documentation and take adequate notes about their particular case before proceeding. Once the game starts, you cannot return to this screen and all its vital information until the patient either dies or is successfully treated.

Actual play begins with the injection of a microscopic probe into the patient's common iliac vein. All you old-timers out there may note that this Simulation is very similar to the movie *Fantastic Voyage* (*sans* Raquel Welch).

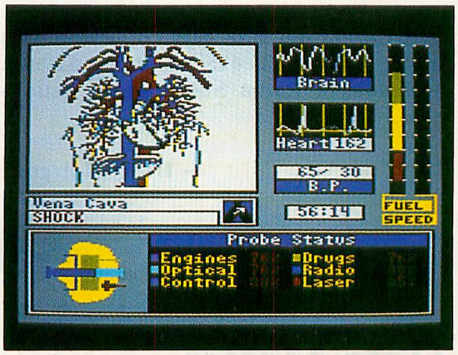
The probe is a well-equipped but rather fragile craft. Sensors detect and display the heart rate, blood pressure, and EKG of the patient on a continuous basis. A visual monitor is your view into this internal world, while other gauges and indicators display power status, laser condition, drug supplies, and other vital information.

Your task is a simple one: Pilot the craft through the venous system, through the right side of the heart, through the lungs (where you cross over to the arterial side of the circulatory system), back through the left side of the heart and up to the brain, where you finally perform your surgery!

Along the way you have to deal with invading bacteria, viruses, and the body's own immune system. The craft is a foreign body, and the patient's body will try to reject it, especially if he or she has been ill recently (remember to read the chart and take notes). Each of these attempts at rejection causes damage to the craft, which can result in partial loss of visual reception, loss of drugs stores, and damage either to the engines (reducing speed) or to the control system (reducing the craft's maneuverability). Eventually, encounters with these hostile forces will cause the outright destruction of the ship, the death of the patient, and the end of the game.

But medicine is based on knowledge and hope! And *Microscopic Mission* provides the player with both of these essential tools. There is an on-board library that can readily identify and explain the proper uses of the various tools, drugs, and instruments necessary to treat all the medical emergencies you will encounter. Whenever an invading microorganism is targeted within the laser sight, a press of the F1 key will prompt the ship's onboard library for more detailed information. Sequential screens detail the organism, describing where it originated, what diseases it can cause, and the proper treatment. The organisms are quite real, and the recommended treatments are medically accurate.

Points are awarded for correctly identifying an invading microorganism and dispensing the appropriate prescription. However, the reverse is also true. Failure to correctly diagnose a disease (or to successfully treat a physical problem such as an irregular heart beat) results in the loss of points. Indeed, the first game I played resulted in an ego-shattering score of -2,000. Fortunately, the cumulative score log does not recognize values less than zero. Whew!



As the ship cruises through the various arteries and veins, the view constantly changes; erythrocytes (red blood cells) are numerous and constantly stream by the craft, as do the less numerous basophils, eosinophils, lymphocytes, etc. Even occasional immune globulins are seen! Throw in a spirochete or two, some *yersinia pestis* . . .

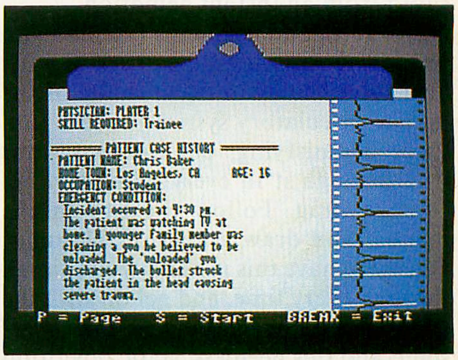
The anatomy lesson is equally impressive, replete with animated valvular leaflets in both ventricles of the heart. Also, atherosclerotic plaque abounds (hardening of the arteries). Incidentally, you can perform a real service for your patient by blasting those little grease spots with your laser (points never offend someone who once scored -2,000!).

By now you get the idea — the terminology is imposing. Those last paragraphs are but a sample of the treasures that have been planted within this program. I prefer to think of any learning experience in positive terms, but exposure to medical terminology may truly be a death sentence to some. If the terms that were thrown around so liberally a few sentences ago are a turn-off, I suspect that *Microscopic Mission* will be a disappointment for you. Be forewarned, and factor this into any purchase decision.

While we're on the subject of medical terminology and personal preferences, the matter of what age group would benefit from exposure to *Microscopic Mission* becomes quite important. While the terminology is certainly at the high school level and beyond, there is at least one other consideration that many parents will want to know about. I've witnessed far too many people express offense when sexual information — no matter how it is displayed, or how important the message (consider AIDS) — is discussed. On your travels through the body, you will encounter noxious, sexually transmitted gremlins such as neisseria gonorrhea and treponema palladium. The library accurately identifies these organisms as sexually transmitted, and offers advice on their treatment and avoidance. You have already been exposed to some of this terminology. A few paragraphs ago, the term *spirochete* was used. If you didn't recognize *that* clue . . .

Microscopic Mission breaks the mold in several other respects, not the least of which is the implementation of the CoCo 3 and OS-9 Level II. No toy business here, not at all! (Hello, Fort Worth, are you listening?)

This program was initially written for MS-DOS computers and ported over to the CoCo via OS-9 Level II. As I own an MS-DOS engine, as well as a 512K CoCo 3, I purchased both the MS-DOS and CoCo 3 versions of *Microscopic Mission* and ran them side by side. Both of these computers (and their operating systems) have their respective strengths and weaknesses.



PHYSICIAN: PLAYER 1
SKILL REQUIRED: Trainee

PATIENT CASE HISTORY
PATIENT NAME: Chris Baker
HOME TOWN: Los Angeles, CA AGE: 16
OCCUPATION: Student
EMERGENCY CONDITION:
Incident occured at 4:30 pm.
The patient was watching TV at
home. A younger family member was
cleaning a gun he believed to be
unloaded. The 'unloaded' gun
discharged. The bullet struck
the patient in the head causing
severe trauma.

P = Page S = Start BREAK = Exit

MS-DOS machines are simply horrid at animation. Much of this is due to the fact that programmers insist on writing for the lowest common denominator in MS-DOS graphics, which is a standard called CGA (a resolution comparable to the CoCo 3 with an RGB monitor). But the MS-DOS machines have no provision for decent sound. Indeed, the cardiac arrest alarm in *Microscopic Mission* sounds like a mouse with a bad cold — hilarious, not alarming, and quite distracting.

Games are also speed-dependent, and

even with the processor set to 8 MHz, *Microscopic Mission* lagged terribly. Compared to the OS-9, Level II version, the MS-DOS version played in *slow*, disappointing motion. The documentation is the same for both versions, and aside from sound and speed differences, it was impossible to tell which version was which merely by looking at the monitors.

These variations highlight the subtle differences that go into a great program. While I would give the OS-9 version a 9.8 out of 10, the MS-DOS program would rate a "do not buy," in spite of the program's obvious merit.

A rating of 9.8 is hallowed ground, but some aspects of the program are a bit cumbersome. *Microscopic Mission* is active, at times too much so. I often found myself working the joystick (not required, but *highly* recommended), banging the < and > keys (to change direction), dispensing a drug (press D), and stopping the screen to prescribe a lifestyle change, *all at once.*

The CoCo 3 is an impressive machine, but it can handle only one input at a time. This leads to commands stacking up or getting lost, and the operator getting confused. Take it slow and easy until you become comfortable with the controls and their limitations. And one other tip — if you score in the negative range (or zero, as the cumulative scorekeeper sees it), just exit the game and restart the program. By doing this, a hard-fought skill rating can be saved from an instant demotion.

In addition to becoming familiar with medical terminology, the operator must also solve the anatomical riddle of the human circulatory system. Once is fun, twice is satisfying, but puzzling your way through it in every game can become a drag. Follow the tips in the manual and draw a map of the lungs. Once you have this in hand, you can sail through every time, and get on with the show. Everyone is allowed one oversight, and this needless, static repetition of the same maze is a major flaw, but one that can easily be overcome.

Microscopic Mission is supplied on a single flippy disk. The OS-9 Level II boot routine is on Side 1, as is the game initialization scheme. Follow the prompts, flip the disk over, and the game executes from the second (flip) side of the distribution disk. Interestingly, Side 1 may be backed up by the conventional `BACKUP` command, but Side 2 is apparently copy-protected.

Minimum system requirements are a 128K CoCo 3 (512K optional) and a single disk drive. The use of an RGB monitor is a must, as the visual displays are extraordinary. The optional joystick is also a virtual requirement; there is simply too much keyboard *work* involved without it. The documentation is supplied as a bound 30-page manual, and is on par with the overall quality of the program (OS-9 version). A little perseverance, some luck and a steady hand are your keys to a memorable experience. The life you save may be your own.

(Activision, Inc., P.O. Box 7287, Mountain View, CA 94039, 415-960-0518; $29.95. Available in Radio Shack stores nationwide.)

— Henry Holzgrefe

Software CoCo 3

Data Master — Friendly OS-9 Filer

One of the major reasons given for the purchase of a computer is the organization of information. Usually, the new owner wants to organize a music or video tape collection, a stamp/coin collection, recipes, etc. There are specialized programs for such needs (some have appeared in THE RAINBOW), but there is nothing like a good generic database management system that can handle a variety of information applications.

Computerware's *Data Master* is such a program. Running on the CoCo 3 under OS-9 Level II, *Data Master* is a much friendlier version of two of its previous incarnations. Some years ago, Computerware published a program called *Data Bank*. Shortly after its publication, Tandy licensed the program from Computerware and renamed it *OS-9 Profile*. *Data Master* is fundamentally the same as *OS-9 Profile* in terms of overall capability, but is easier to use due to the windowing capability of OS-9 and the CoCo 3.

I have been using *OS-9 Profile* for a number of years and was pleased to see this update, although I still have some complaints. Fortunately, there is complete compatibility among the three programs. By the way, there is an upgrade option for those who have either *Profile* or *Data Bank* and want to obtain *DM*.

After copying *Data Master* into the `CMDS` directory, you boot the program by typing `dm`. A startup file is provided but is not necessary if your system sets up a standard 80-column text window. Once *DM* has booted, the screen resembles a typical MS-DOS database screen. The top line of the screen is a menu bar from which pop-down menus appear at the press of certain keys. Within the menu bar are the following options: Desk, File, Work, Output, Edit, and Template. Access to these options from the menu bar are accomplished by typing the slash (/) key followed by 'D', 'F', 'W' or 'T'. The slash key always brings up the last selected pop-down menu. Selecting an item from the menu bar summons a dialog box, which acts as a submenu or requests further information of the user.

The menu bar provides access to all the major tools needed to set up and use a database. The Desk option provides the capability to change or view a directory, invoke a shell, set auto update, and change the printer path and monitor type. The File option takes care of opening, closing, renaming, deleting, and backing up files. In addition, there are options to save data in a *DynaCalc* spreadsheet format as well as load data from a spreadsheet. When starting a new database, you choose the Open option and tell *DM* the new filename.

After you have opened a new file, you must design the record structure, i.e., the number and type of fields that comprise a record. For example, I maintain a database of public domain software, a simple file containing the program's name, type, disk number, source, and a brief description.

Using the Edit option from the menu bar, you can add, modify, delete, and view the fields in the database as well as view the entire record structure.

When the record format is complete, the next step is to set up screen, access and report formats from the Templates menu. *DM* maintains up to nine screen, access and report formats that can be selected through the dialog boxes at any time. A use of the screen format may be to design various screens for data display. Designing these screens is very easy using the arrow keys to add descriptive information to the screen format. With the report formats, the user has control of the layout — margins, line width and lines per page — and can even send printer codes to the printer. The access formats allow you to sort the database up to three fields deep for each format. In my public domain program database, I have an index sorted by disk number and program name, another by program type and disk number, and still another by just a program's name.

The Ouput menu allows you to examine all the records or a specific selection in the database using the current access method. Records can be displayed on the screen according to the current screen template, or they can be presented in spreadsheet style (one record per line). I like the spreadsheet option, as you can review a lot of data easily.

The documentation provided with *Data Master* consists of a 42-page manual, which gives a clear and concise description of all aspects of the program. The manual also contains an appendix that provides a tutorial using a file provided on disk. Another appendix gives technical information on *Data Master* files and on accessing them from BASIC09.

I have two problems with *Data Master*. The first is that field lengths cannot exceed 64 characters, and the second concerns report formatting. A maximum of five printed lines is alloted per record, which I find rather limiting. These two limitations probably won't affect most users in average use, but can be problems for larger application. In any case, I do strongly recommend *Data Master* as a good generic database manager that is easy to use and provides a lot of capability. The frosting on the cake is that *Data Master* maintains downward compatibility with *OS-9 Profile* and *Data Bank*.

(Computerware, 4403 Manchester Ave., Suite 102, Box 668, Encinitas, CA 92024, 619-436-3512; $64.95)

— Donald D. Dollberg

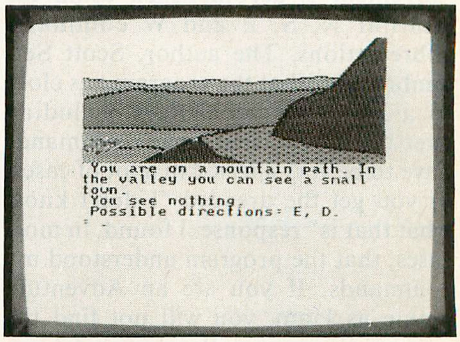
Software

CoCo 1, 2 & 3

Tomb of T'ien — Adventure in the Far East

Tomb of T'ien is a graphics Adventure game set in the far eastern part of Asia. As in many graphics Adventures, this one uses the split-screen feature displaying the current surroundings on the top half of the screen and the text description and action prompt on the bottom.

The scenario casts you as an adventurer trying to recover treasure that was stolen from your village. You must find the sacred shrine and conquer the evil dragon before he burns your village again. You experience many obstacles during this trek and will frequently call on the great Guru for advice.



```
You are on a mountain path. In
the valley you can see a small
town.
You see nothing.
Possible directions: E, D.
:
```

T'ien is written for a 64K Color Computer with Extended Color BASIC, but runs on the CoCo 3, as well. It is available on either disk or tape. If you have the CM-8 RGB monitor connected, you will get a black-and-white picture. If you use a TV set or color composite monitor, you will see the Adventure in full color. The program is copy-protected, but a procedure is

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SERINA System-mode Debugger for OS9 Level 2 ...... $139.00
MSF MS-DOS File Manager for CoCo3/OS9 L2 .... $45.00
MSF with SDISK3 .... $65.00
Shipping — N. America: $5, Overseas: $10

Clearbrook Software Group, Inc.
U.S.: P.O. Box 8000-499, Sumas, WA 98295
CANADA: P.O. Box 8000-499, Abbotsford, B.C. V2S 6H1
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See review in December 1987, Rainbow Magazine.

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Up to 250 program names per file and up to 18 files per disk.
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See review in January 1988 Rainbow Magazine

ALL PROGRAMS REQUIRE 32K CoCo 1,2 or 3 and 1 DISK DRIVE

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P.O. BOX 391 CLEVELAND, OHIO 44107

provided to a make a non-executable backup that can be used to restore the original if necessary. If trouble persists, the company will send you another copy free of charge.

The Adventure is challenging and incorporates many scenes and objects for you to `GET`, `EXAMINE` and `DROP`. Movement is accomplished using the familiar N, S, E and W command abbreviations. The author, Scott Settembre, says that the program has close to a 200-word vocabulary including over 100 nouns. That means commands have to be very specific in a lot of cases, or you get the dreaded "I don't know what that is" response. I found, in most cases, that the program understood my commands. If you are an Adventure junkie as I am, you will not find the commands unusual. Besides, an Adventure with a smaller vocabulary is very challenging to communicate with.

Tomb of T'ien is not a snap to solve. I spent many hours playing with it for this review and finally sneaked a peek at the solution the author provided before I was able to complete the Adventure. (Don't look for the solution if you purchase *T'ien*, because it's not part of the package.) Like anything challenging, you will do your best if you solve the Adventure a step at a time and keep a map of your progress. You can save your work on disk and pick up where you left off, so there's no need to try to solve it in one sitting.

Tomb of T'ien is an exciting Adventure with good graphics. I'd like to see a CoCo 3-specific version that could take advantage of the machine's enhanced graphics.

(Valkyrie Sofware, P.O. Box 2120, Monroe, NY 10950, 914-783-0191; $19.95 plus $2 S/H)

— Jerry Semones

Software CoCo 1, 2 & 3

Lot-Pro — CoCo Helps You Pick Six

To win the lottery in my state, you must pick six numbers out of 40, and those six must match the numbers that the Lotto machine picks. In choosing these numbers, some people use their birthdays or social security numbers, or they just play a hunch. Not very scientific. After looking into the situation, I wondered if my Color Computer could assist me in choosing winning Lotto numbers in a more logical manner.

Evidently Carl Nicita also thought computerized forecasting of lottery numbers has merit because he has released a program titled *Lot-Pro* to assist owners of Tandy Color Computers in becoming millionaires.

The principle of the program seems to be that although the "Magical Lottery Number Picker" is supposed to generate totally random numbers, there might be a repeating pattern that can be analyzed to determine what numbers will be most likely to appear in the future. Sounds logical enough, doesn't it? Let's take a closer look at the process.

First, you have to do some homework and get a list of numbers that have hit during the past 15 games for the lottery you want to analyze. You can get this list from your State Lotto Office.

Next, you enter the amount of numbers used in the lottery game, and the computer asks you a series of questions about how often this number has been a winner and the sequences in which these numbers have won. Your CoCo crunches this data and gives you a list of the hottest numbers down to the duds.

Lot-Pro gives you the option of using a wheeling system to add your favorite lucky number to these "hot numbers" to generate strings of six numbers.

By analyzing this printout and placing appropriate bets on these combinations, your odds of picking a winner can be greatly increased, or so the documentation implies.

Operation of *Lot-Pro* is easy. Screen prompts assist the user in the steps necessary to generate a printout. The program is also well-documented with a five-page instruction manual that describes how to operate the program, how it optimizes your chances of winning and how to analyze previous winning numbers to generate your data.

Does the program work? Well, the program runs, and it generates the series of numbers as promised. Does it produce winners? There was only one sure way to find out, by betting hard cash.

Here's how I did. Of the six numbers picked by the program, I hit two out of six. No bucks, but not bad. Realizing that a single bet would not prove or disprove the system, I also placed imaginary bets on the 41 other combinations that were generated by the wheeling system.

The results of these 41 bets were:

0 hits	13
1 hit	19
2 hits	6
3 hits	3
4 hits	0
5 hits	0
6 hits	0
	--------
	41 bets

These bets would have generated no winnings. Can you do better? I don't know. But you can easily find out by trying *Lot-Pro*.

(CJN Enterprises, P.O. Box 40487, Bakersfield, CA 93384, 805-836-1323; $25.95)

— Bruce Rothermel

Software CoCo 1, 2 & 3

The Astro Fortune Teller — Portents of Your Destiny

The Astro Fortune Teller is a machine language program written for the ECB Color Computer 1, 2 or 3. The author, R.J. Babich, Ph.D., is a sociologist and astrologer, and the program is based on his astrological principles.

If you run *The Astro Fortune Teller* on a CoCo 3 and the Tandy CM-8 RGB color monitor, the graphics title screen appears in black and white. This does not present a problem, however, as the title screen provides no useful function other than appearance (which is quite attractive). If this bothers you, you can always hook your CoCo 3 to a color TV set or use a composite color monitor.

The Astro Fortune Teller uses the standard 32-column screen to display questions and answers.

The program is supplied on a copy-protected disk, but the instruction sheet that comes with the software tells you how to make a non-executable backup copy to be used to restore the original disk if a problem arises. If the program develops a problem that cannot be fixed by a restoration, the company will send you another for $3 to cover postage and handling.

The Astro Fortune Teller fills up an entire disk. In checking for the amount of free memory left on disk (`?FREE(0)`), I got a response of 0 — this is due to the many data files (astrological tables) that comprise the various answers to your questions.

There are 30 pre-written questions to select from. After loading the program, you are asked for the day of your birth, your first name, and the current day of the week. You can then page through the various screens of questions to select the one you would like the fortune teller to answer. Such questions as "What day of the week or month will be the most important to me?"; "Is my absent friend happy or in trouble?"; and "In what calling or business will I prosper?" are typical. I would prefer asking my own questions, but I am sure such a program would be difficult to write given the memory constraints of the CoCo 1 and 2. Besides, the questions available pretty much cover the waterfront in terms of their scope. I must admit that I was surprised that many of the answers were very descriptive of some of my own situations and lifestyle.

I found *The Astro Fortune Teller* to be fun and interesting, and probably typical of the kinds of responses one would expect from a real fortune teller. It's not the kind of program that really fills a need in one's business or personal life, but can be used as an entertainment device. Who am I, though, to question the all-wise *Astro Fortune Teller*? Maybe if I heeded his advice I wouldn't have to work for a living!

(The Saint John Gallery, P.O. Box 613, Mt. Sinai, NY 11766, 516-928-6991; $19.95 plus $1.75 S/H)

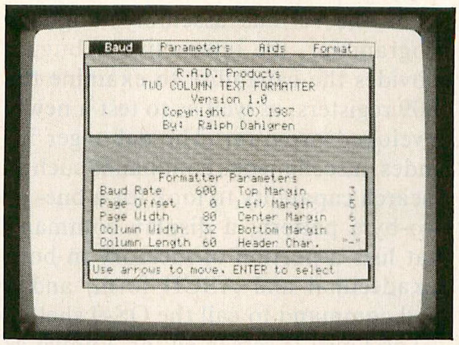
— David Gerald

Software CoCo 1, 2 & 3

Textform — Outputting Text in Two Columns

Have you ever needed to create a printout of a file in two columns? Or wanted to LLIST BASIC programs in double-column format? I need to do things like that all the time. For one of my physics classes, I like to print a set of instructions that can be folded into a small booklet.Programming for two-column text ouput required a lot of time and creativity — until now.

Textform from R.A.D. Products takes the work out of formatting text in two columns. The input text can be from any ASCII text file such as a BASIC program listing, word processor, or even a list. The author solves a programming problem in an elegant way.



```
            R.A.D. Products
       TWO COLUMN TEXT FORMATTER
              Version 1.0
          Copyright  (C) 1987
          By:  Ralph Dahlgren

         Formatter Parameters
Baud Rate       600   Top Margin       3
Page Offset       0   Left Margin      5
Page Width       80   Center Margin    6
Column Width     32   Bottom Margin    3
Column Length    60   Header Char.   "-"

Use arrows to move. ENTER to select
```

Textform comes on a single, unprotected disk and includes three files. `TEXTFORM.BIN` is the main program and does all the work. `FONT.BIN` is, I presume, a font file for the screen display. `DEFAULT.PRF` contains default settings for formatting text output. *Textform* is very easy to use even though it has many options and is quite flexible. The user interface is similar to the Apple Macintosh interface.

Input to the program is accomplished by an option bar and pull-down menus, which can be accessed via the arrow keys, joystick, mouse, Hi-Res input pack or digitizer pad. The program works just fine from the keyboard; the rest of the options are handy for those who prefer other input devices. Giving the user a choice is a professional touch I'd like to see in more programs.

Printer rates from 600 to 9600 baud can be set using the menu bar option Baud; specifying the file to print is done within Format. The two remaining menu bar options are Parameters and Aids. Parameters contains settings that affect the final look of the document. There are inputs for left, right, center, top and bottom margins; page and column widths; page offset; column length; and header characters.

Some of the options I found to be redundant. For example, I don't see the need to specify the column length if the top and bottom margins, header and page length have been specified. In fact, if all the settings don't agree, some pretty odd output is produced. This is only a minor inconvenience, however.

The author discusses how to choose parameters in the instruction manual and even gives equations for calculating them. Once preferences have been set within Parameters, they can be stored for future use. Different preference files can be created for different jobs. This way, when the output looks good, you never have to remember how it was done. All you have to do is save the settings — another handy, professional feature.

The program also allows you to send printer codes directly to the printer. This is an essential feature if your printer requires special codes for different typefaces or type widths. This ability could have been coded into the program, but that would mean you would need a different version for each printer you use. I much prefer the manual approach; I've had a few oddball printers that refused to work with certain programs. That wouldn't be a problem with *Textform*.

Once the preferences are set, all that is left to do is select a file and answer a couple of questions. Then output begins. Before printing, word wrap can be turned on or off. Just after choosing the file to process, you are asked if you want to output to printer or a disk file. I wish more programs allowed this choice. With it, *Textform*'s flexibility is multiplied manifold. With a word processor you can "massage" the output from *Textform* any way you like. This allows boldfacing, underlining, etc., in two-column format. I really have a lot of uses for this option.

If *Textform* stopped here it would be worth buying, but it doesn't. If you enter "slash" commands (command lines preceded by /) in your text, you can modify the output as the text is processed. The slash commands allow you to control header line text, page numbering, word wrap and forced page ejection. The manual clearly shows how all of these are done, providing several examples.

This wouldn't be a review if I didn't have a complaint or two. I already mentioned the "overlapping" parameter settings above. They are easy enough to work around that I don't find them a real problem. The only other complaint I have is also a small one: I can't find a way to get a directory listing from within *Textform*. If I remember to look at a directory and write down filenames before I start, that isn't a problem. Unfortunately, I never seem to remember to do that. I also seem to be good at forgetting the exact name of a text or parameter file just before I need it. It would be really handy to be able to look at a directory listing without exiting *Textform*. I can live with the problem — it's just a nuisance.

My recommendation is clear. If you do much text processing, you probably need *Textform*. If you do any two-column text processing, you definitely need *Textform*.

(R.A.D. Products, 194 Hotchkiss St., Jamestown, NY 14701, 716-665-2124; $34.95 plus $3 S/H)

— Donald L. McGarry

Software CoCo 3

OS-9 Development System — Completing the OS-9 Trilogy

When Tandy released the OS-9 Level II Operating System for the Color Computer 3, it soon became obvious that it was only a part — although a major part — of the full system. Careful review of the Tandy catalog revealed two additional packages: *Multi-Vue* and the *OS-9 Development System*. These three packages make up what I consider to be the complete OS-9 Operating System. Some users will run out and buy all three packages, while others will be content with the basic operating system. Although it is not possible to cover all the details of each item because of space limitations, I'll try to provide sufficient information so that you can determine your own needs.

First of all, the *Development System* is a package of programs for the advanced OS-9 user who programs in assembly language.

The *Development System* comes in a three-ring binder like the Level II package, with a "flippy" disk to accommodate all of the programs. These programs include an interactive debugger, screen editor, relocating macro assembler, several utilities to simplify assembly language programming, and 12 additional commands that were left out of the basic package but are familiar to all Level I users.

The interactive debugger is essentially the same as the Level I `Debug` command, so those familiar with the Level I version know what to expect. For the new user, a major function of `Debug` is to patch programs and other modules. For Level II, this can be accomplished using the `ModPatch` command, although `Debug` is more versatile because you can scan memory and look at specific memory addresses. `Debug` also contains a built-in calculator that displays results in both hexadecimal and decimal. The calculator mode is intended for quick calculations pertinent to the development of an assembly language program.

For the serious assembly language programmer, the interactive debugger provides the capability to examine the 6809 registers, as well as to test a newly developed program. The debugger includes miscellaneous commands such as a search capability to look for a one- or two-byte pattern, a display command that lists a portion of memory in both hexadecimal and ASCII form, and a shell command to call the OS-9 shell.

The Level II screen editor, known as `Scred`, is a screen-oriented text editor designed to prepare program text for the assembler or other high level languages. The major features of `Scred` include adjustable screen and workspace size; cursor positioning by characters, words and line; cut and paste; change, find and search strings; and wild cards. While `Scred` has most of the features of a good word processor and can be used for preparing typical text documents, it does not contain features such as word wrap and text formatting.

`Scred` has three modes of operation — Command, Edit and Insert. Command mode provides the capability for manipulating files such as load and save. Edit mode provides for text modification in the edit buffer, and the Insert mode allows direct insertion of new text. `Scred` comes with a file called `TermSet`, which allows for several different terminal types to use `Scred`. Support is provided for both the VDG screen (the 32-by-16 CoCo screen) and the standard windows, as well as the terminal types KT7, ANSI, ABM85 and ABM85H. The manual provides enough information for writing additional terminal types for unsupported terminals.

The relocatable macro assembler, the heart of the *Development System*, is unlike the assembler (`ASM`) provided in the Level I system. `RMA` allows the programmer to assemble sections of assembly language code independently. The assembled sections are referred to as relocatable object files (ROF). With the linkage editor (`RLINK`), any number of ROF's can be combined into a single, executable OS-9 module. The features of `RMA` include built-in functions for calling OS-9 system routines; position-independent, re-entrant code support; creation of standard subroutine libraries, which can be written separately and then linked together; conditional assembly and library source file support; and OS-9 modular, multitasking environment support.

`RMA` is a two-pass assembler. In the first pass through the source code, `RMA` creates the symbol table. During the second pass, `RMA` adds the machine language instructions and data into the relocatable object file.

Included with `RMA` is the all-important `DEFS` directory. Files included in this directory contain definitions of symbolic names for all system calls. The file `OS9Defs.a` provides definitions for all system functions under Level II. For programmers who might prefer to use the Level I `ASM` assembler, the `DEFS` directory contains the files `DefsFile`, `DefsFile.dd`, `OS9Defs` and `SysType`. These files contain Level II information in the correct format for `ASM`. Also included in `DEFS` are the files `Wind.h`, `Mouse.h` and `Buffs.h`, which contain data structures for window, menu, mouse and buffer manipulation using the C language. Still another file, `Cgfx.l`, provides Level II graphics routines for the C language.

Space does not permit an in-depth discussion of `RMA` and `RLINK`, but I would like to mention that `RMA` is not just for the advanced assembly language programmer. As everyone is aware, there are some very interesting utility programs published in THE RAINBOW and available on bulletin boards. Without `RMA` and the `DEFS` files, it would be impossible to obtain an executable module. This may be reason enough to consider the purchase of the *Development System*.

The modular concept of OS-9 makes program development much simpler, especially with tools like `RMA`. However, keeping track of the various modules and ensuring that you are working with the most current versions becomes somewhat difficult. Enter the `Make` and `Touch` utilities, which are standard UNIX tools used during program development to make sure all modules are up-to-date. `Make` also simplifies the process of recompiling the entire program when one module is updated.

Also included in the *Development System* is a virtual disk driver, commonly known as a RAM disk. A RAM disk is simply a part of memory formatted to operate as a standard disk drive, but at a much faster speed. RAM disks are useful when dealing with very disk-intensive operations, such as assembling or compiling programs, or for editing large text files. I find it particularly useful when downloading from bulletin boards.

To use the RAM disk, all you have to do is load the driver `RAM` and an appropriate `r0` descriptor. The disk comes with three versions of `r0`: a 96K version, 128K version and a 192K version. The manual provides information on how to change the `r0` descriptor for other memory sizes. Once `RAM` and `r0` are loaded, all that is needed is to `iniz r0`, and the RAM disk is ready to go.

When the original Level II package was released, many people were disappointed that a number of Level I commands were not included. However, all of the missing commands are included in the *Development System*. The commands are `Binex`, `Dump`, `Exbin`, `Login`, `Park`, `Save`, `TSmon`, `Tee` and `Verify`.

Although most of these commands are not often used, I have had need for the `Save`, `Dump` and `Verify` commands and would have liked to have seen them included in the basic Level II package.

The *OS-9 Development System* is certainly a must for all assembly language programmers. Other users should weigh the cost versus the need for this capability. Overall, Tandy has provided an excellent package for program development with all the supporting tools needed for this endeavor.

(Tandy Corporation; $99.95. Available in Radio Shack stores nationwide.)

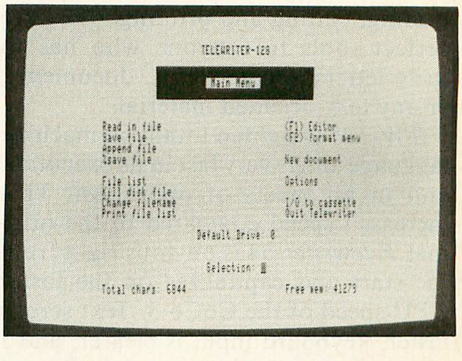
— Donald D. Dollberg

Software CoCo 3

Telewriter-128 — 80 Columns, Lightning Speed and New Power Enhance the "Old Standard"

In my opinion, the one program that has made the Color Computer the popular small computer that it is today is *Telewriter-64* from Cognitec. *TW-64* introduced thousands of us to the world of word processing and enabled us to use these inexpensive computers in new and imaginative ways.

Now Cognitec, in conjunction with Bob van der Poel, has released *Telewriter-128* for the CoCo 3. They have incorporated the best features of *Telewriter-64, Telepatch* and *Ultra-Telepatch* into this exciting version, while adding many new features and refinements.



```
                 TELEWRITER-128

                    Main Menu

     Read in file                 (F1) Editor
     Save file                    (F2) format menu
     Append file
     Asave file                   New document

     File list                    Options
     Kill disk file
     Change filename              I/O to cassette
     Print file list              Quit Telewriter

                Default Drive: 0

                  Selection: ▒

     Total chars: 6844            Free mem: 41279
```

The program is not copy-protected, so making backup copies for your own use is not a problem. The *Telewriter-128* disk contains the *TW-128* program, two short demo text files, and a conversion program, which lets you convert older *TW-64* BIN files to work on *TW-128*. Cognitec has discontinued the use of binary file storage in lieu of the universally accepted ASCII file saves.

For those of you not familiar with the

Check Account Information System

If you have one or more checking accounts then you need CAIS. This is not just another checkbook program but an easy to use, menu driven, disk based information system for the CoCo 1, 2, 3.

Record all account activity. Keep track of your expenses using the 36 categories that you define. Set up automatic transactions for such items as direct deposits and deductions. Reconcile and balance your account(s) in minutes! Other features include check search on any field, edit and delete capability, display and print options, multi-drive capability and more. Requires 1 drive, printer optional.

Reviewed in RAINBOW, February 1988.

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term, *word processing* allows you to write and edit text on the screen of your computer monitor and print hard copies on your printer. You can then save the text to tape or disk for later recall or editing. Word processors are, in effect, electronic typewriters that can be used to compose any kind of text for reading, editing and printing. They are perfect tools for anyone who has to write letters, create forms, documents, or any text-oriented material.

TW-128 is written totally in machine language and is very fast in its execution and in all facets of operation. This increased speed compared to the original *Telewriter-64* is obvious right from the start and capitalizes on the faster CPU speed of the CoCo 3. Text scrolls faster, keyboard input is clearer, and I could find no evidence of keyboard delay or screen updating. *TW-64* used its own software-generated character set, while *Telewriter-128* accesses the CoCo 3's video circuitry directly. The result is an outstanding 80-column display on a monochrome or RGB monitor.

Getting Started

After executing the program, you are greeted with a colorful credit screen and then automatically switched to the main menu. Two of the options on this screen are Read, which allows you to load in a file from either disk or tape, and Save, for saving a file to disk or tape.

In the *TW-128* disk version, the Read command first displays the names of all ASCII text files on the default drive. You select which file you want to read in by using the arrow keys to move the highlighted cursor to the file of your choice and pressing ENTER.

If you are using cassette, a window is displayed that requests the filename of the file to read in. Cognitec provided a nice touch in allowing disk users to save their text files to disk without having to go to a separate Disk I/O menu. Just pressing CTRL-Q at any time while in the editor or text mode performs a "quick save." Provisions are also included to automatically make a backup of your text file every time you save it to disk.

Main Menu and Editor

From the main menu, you can at any time go directly to the Editor screen by pressing the F1 function key. Similarly, you can go to the Format menu by pressing F2. This makes it very easy to jump back and forth between your text and either of the two menus.

You can select either the insert or overstrike mode by using CTRL-O to toggle between the two. CTRL-M now performs a true block move within the editor — you don't have to go back to the main menu. CTRL-Y does a word delete or "yank," and a "non-breakable space" can be created using the ALT key and the space bar.

Word wrap occurs at the current value of "characters per line," and not only at the edge of the screen, as in *TW-64*. (When the number of characters in a line of text approaches the value you have set for the number of characters per line allowed, the cursor automatically begins a new line. Word wrap can be toggled on or off depending on your preference. You can set characters per line in the Format menu as well as in Editor mode by pressing CTRL-@.

While the Read in File option displays only text files saved in ASCII form, the File List command lets you display *all* files on the disk and also returns the number of free granules remaining on the disk.

From the main menu you can also kill a file, change a filename, or print a file list. "Print File List" lets you send a list of the selected disk contents to your printer. This is a handy way to keep a hard copy of all your word processing files as you save them to disk, and it can even be used to catalog your disks.

Total characters used and the amount of remaining free memory are displayed at the bottom of the main menu screen. On my computer, the free memory amount was 48,123. This represents roughly enough space to accommodate 24 pages of text. As text is typed in, this number will decrease accordingly. On

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the other hand, the total characters number will increase as text is typed in.

The program defaults to Drive 0 but can be changed simply by pressing 1, 2 or 3 while in the main menu mode. Disk I/O is lightning fast, as the I/O programming is contained in memory. There is no wait when you want to access your disk. You're there instantly.

Options

The Options command on the main menu allows you to configure *Telewriter-128* to suit your personal preferences. The Options menu lets you select character color (63 choices) and background color (also 63 choices). The color changes occur live — that is, as you increase or decrease the values with the arrow keys, the screen and character colors change before your eyes. You can see instantly the color combination that best suits you. I like white letters on a royal blue background, but the choices are seemingly endless.

Another option lets you turn the color off if you are using a monochrome monitor or a black-and-white TV. You can also set the number of displayed lines on the screen to 24, 25 or 28. The text display on my CM-8 RGB monitor was great, and on the Magnavox 8915 it looked even better. If you plan on using a TV set, you may have to use the program in the 40-column mode due to lower resolution. You can toggle between 40- and 80-column modes with SHIFT-0.

Commands are also provided on the Options menu to set key repeat and delay rates and key click pitch. You can turn the key click on or off using CTRL-L. I like hearing the key clicks — they give me positive indication that a key has, indeed, been pressed. Whatever options you select can be saved to disk or tape so that you won't have to reenter them each time you boot the program.

Format and Print

The Format and Print menu screen is accessed by pressing F2 at the main menu. This is where you select line spacing, margin settings and lines per page. As in *TW-64*, you can number the pages and select where across the bottom of the page to put the page number.

"VPrint" is a major addition that allows you to preview your document on the screen so that you can see how the document will look before you actually print it. It shows the margins, page breaks and page numbers just as they will appear on paper. Holding down a SHIFT key during preview slows down the scrolling speed of the document — you can change this speed in the Options menu if you want. This preview feature is a real bonus and will save a lot of printer paper and frustration.

Another new feature much to my liking is the #Print command, which allows you print out any number of copies of your document.

The *Print command is provided so that you can send a fully formatted file, complete with embedded control codes, margins and spacing, to disk. This kind of file is generally useful with a communications program when you want to ensure that the total file is sent intact.

As in *Telewriter-64*, you are able to print portions of a document. CTRL-E is used to mark the end of the portion of text that you want to print. Pressing the % key within the Format menu sends the marked portion to your printer. Also as in *TW-64*, you can right-justify your text. Note that the result of right-justification does not show up on the Editor screen, but it will show up on the VPrint screen and on the printed page, as well. *Telewriter-128* supports all baud rates and is adjustable from 110 to 9600 baud using the XMIT Rate command.

Other New Features

New to *TW-128* are 26 individual macros that can be used to store often-used text of up to 127 characters. A nice feature here is that you can also store embedded control code sequences. Anything you set up in these macros will automatically be saved to disk when you select Save on the Options screen.

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This is nice because you can set up your printer for different fonts, print sizes, etc. Recalling a macro is as simple as pressing ALT and A through Z. In a typical application, one might have the words *University of Louisville* stored in Macro U. Let's say that I am preparing several letters to an alumni association. Instead of having to type *University of Louisville* many times, I can simply press ALT-U, and the words are automatically inserted in the text.

Pressing a CTRL-F while in the Editor results in a pop-up window where you enter the string of letters that you want to find in your document. A command in the Options menu can be set to ignore case. This means that words such as WORLD, World, or even wOrLd, could be found and displayed from just one reference. If you prefer, you can turn the case sense off so that the matching text must exactly match the search string.

TW-128 supports header and footer commands, as well as alignment protection for columns and many other embedded commands, including embedded control codes.

There is even a Help screen available by pressing CTRL-H. This is very useful in that you won't have to look up various commands and functions in the user's manual.

In Conclusion

Telewriter-128 is impressive. The extensive use of "dialogue" boxes or windows provides a more foolproof way to communicate with the program and results in very clean, efficient and smooth operation. It matches in many ways the capabilities of word processors used on IBM and compatible computers. *TW-128* has virtually all the features required of an excellent word processor except a spelling checker — although it should work with any ASCII-based spelling checker. Maybe the authors will give some thought to that need, especially considering that our CoCo now has a memory capacity of 512K!

Telewriter-128 will set the word processing standard for the Color Computer 3 because it is so simple and user-friendly; the price is about right for a program with the capabilities it provides.

The 81-page tutorial/user's manual is nicely done. It is written in easy-to-understand language, but the program itself is so easy as to make the documentation almost unnecessary. Most people will be able to use the software right out of the package.

About the only problem I could find with *Telewriter-128* is that it took such a long time to arrive in the CoCo 3 marketplace. I am confident, however, that, like good wine, it was worth the wait.

(Cognitec, 704 Nob Ave., Del Mar, CA 92014, 619-755-1258; $79.95 disk, $69.95 tape plus $2 S/H)

— Jerry Semones

Software CoCo 1, 2 & 3

REMUSIC 1.0 — Music to Your Ears

Anyone who has done any BASIC programming knows that there are two schools of thought concerning the use of REM statements. One advocates the frequent use of them to make detailed comments in the program listing so that you can pick up the program later and quickly tell what each line of code is doing.

The second school of thought advocates the concept that REM statements are a waste, eating up valuable memory and processing speed, and that it would be better to delete all REM statements and use the extra memory for better things. In fact, in the early days of personal computing, especially when memory was at the 4K level, there were a number of public domain programs around whose only function was to strip REM statements from a BASIC program.

Well, *REMUSIC* author, William C. Garretson, has just added a third school of thought on the use of REM statements: Make music with them!

REMUSIC 1.0 works on any Color Computer having at least 16K of memory and one disk drive. On the CoCo 3, it will work in the high-speed mode and makes for more pleasant sound reproduction.

The program is both a music compiler and a software music synthesizer supporting over six octaves of four-part music with complete tone and ADSR control. (For those of you who don't know what ADSR means, it stands for "Attack, Decay, Sustain and Release.")

OK, now everybody knows what ADSR is and can fully explain it, right? — *wrong*! One of the best things about *REMUSIC* is its documentation, which goes into great detail to explain not only how to operate the program but also just what all these "synthesized" music terms are, as well. It explains them in terms of how they affect our hearing and how the individual notes and sounds are created. (The author also included a glossary of such terms for quick reference.)

An added bonus to the accompanying documentation and tutorial (which because of its depth and detail could become somewhat trying) is the author's liberal use of witty and sometimes biting comments. Even if the program didn't work well at all, the documentation would be well worth reading.

In *REMUSIC*, Mr. Garretson has created a powerful music text language, incorporating it in such a fashion that the regular BASIC language of the CoCo provides the editor for it.

There are several ways to use the program. The simplest is to create what looks like a BASIC program in which each line is a REM statement. Each REM statement may contain information regarding the playing of one or more voices, and the duration and pitch of a note or rest. If the compiler encounters an invalid music directive in a REM statement, it skips to the next character. Placing other comment lines in the file may have a considerable effect on the compiled music.

Music code can also be embedded in a regular BASIC program with a few lines included at the beginning of the program to call *REMUSIC*. This feature can be used to create interesting graphic/music displays. The third way in which *REMUSIC* can be used is in the creation of stand-alone machine language music files. After a piece of music is written and compiled, it can be saved as a binary file.

Mr. Garretson seems to have put a lot of work into this program and has overcome many of the deficiencies I have noticed in other music compiler programs. For example, the author provides a way to program each voice separately without having to be concerned with what note duration the other voice is using; and he has provided his program with a respectable octave range. Some music programs have a limited range, which makes things difficult when you're trying to transpose a piece of sheet music to the computer. Others boast of a large range, yet tend to distort at the higher pitches. *REMUSIC* can play frequencies as high as the third A above middle C without excessive frequency distortion. In order to really appreciate this you need to pipe the sound output through a speaker of better quality.

As mentioned earlier, CoCo 3 owners can use the high-speed mode to further extend the pitch range and to enjoy better quality sound. However, this will also cause the music to play twice as fast. To overcome this problem, the author has included a utility to compensate.

If you are like me, the first thing you want to do with a music program is listen to just how good it really sounds. After all, isn't that the real test of any computer music program? What I don't want to do is sit down and key in a lot of code for just a simple demonstration. The author anticipated people like me, for he thoughtfully provided several selections of music already keyed in and ready to play. Very impressive, let me assure you.

This program rates very high on my recommended "must have" list.

(Codis Enterprises, 2301-C Central Drive, Suite 684, Bedford, TX 76021, 817-283-8571; $25)

— Kerry Armstrong

Software CoCo 3

The Rat — A Mouse-Assisted CoCo 3 Graphics Package

Into the competitive arena of CoCo 3 graphics programs comes a powerful new challenger — *The Rat*. It was worth the wait. One of the most impressive features of the package is the mouse, which is much better than Tandy's CoCo mouse. In fact, there are very few things about the package that I did not like. (Contrary to the illustration of the mouse in Diecom's ad in THE RAINBOW, the mouse requires no adapter, and simply plugs into your right joystick port.)

While the program works very well on a 128K machine, you will not be able to access all its features until you have a full 512K. *The Rat* supports the 320-by-200 Hi-Res graphics mode, lets you work with 16 fantastic colors at a time, and even allows you to load and edit a picture created with *Color Max 2* or *Color Max 3*.

Upon booting *The Rat*, it does not take long before you are drawing your first picture. In fact, *The Rat*'s extreme ease of use may prove to be a disadvantage — family and friends might be tempted to commandeer the machine and program for themselves (it just about lost me my CoCo 3 to my sons).

I really would like to have seen some "professional" quality pictures, but there are no sample pictures accompanying the package. There is a very good picture of a rat, though, that pops onscreen while the program is loading, but you can't load it in to work with it. However, it wasn't too long before we had pictures of our own. As I said before, the program is very easy to use — and it's good that it is, because the 22-page manual is not the most comprehensive I have ever seen.

Commands are issued from the four pull-down menus that run across the top. Just point and click. The rest of the screen gives you the options of colors, type of "brush," the use of 16 textures, mode boxes (draw, line, circle, etc.), and a "fill" option to be used with box, circle and polygon modes.

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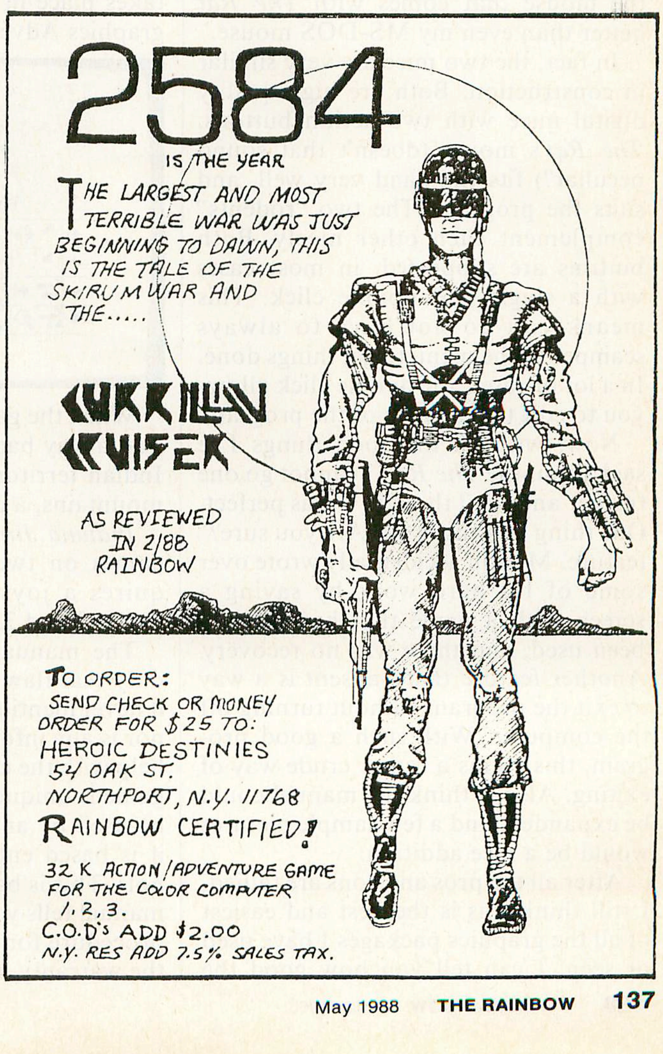
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From the menu, if you have 512K, you can pick which of 10 screens you want to work with. With 128K, you can have only one screen in memory, but with 512K, you can work with up to 10 at the same time. This also allows you to use the "pages" feature. This feature allows screen animation in which the program flips through your screens with an order and speed you determine. If you do not have 512K, you still have the option of "color animation," which allows you to change the colors in a certain order and speed. By itself this feature can produce some interesting results.

Another strong point is *The Rat*'s versatility. If you want a different set of 16 colors, you can select them, just as you can select and save 16 new textures for later reloading. You can even define your own character set or just edit the default set. Even the brush shapes are redefinable. The options available are just too numerous to list. And, again, I have to say that the mouse included with the package is just great! I was so accustomed to the mouse I use with my Tandy 1000 that I guess I got spoiled — I never liked any that were available for the CoCo. But, I have to admit, I like the mouse that comes with *The Rat* better than even my MS-DOS mouse.

In fact, the two mice are very similar in construction. Both are high-quality digital mice with two action buttons. *The Rat*'s mouse (doesn't that sound peculiar?) fits the hand very well, and suits the program. The two "rodents" complement each other nicely. Both buttons are supported, in most cases with a single and double click. This means you do not have to always scamper to the menu to get things done. In a lot of cases, the double click allows you to edit the defaults of the program.

Now, with all the good things I've said about the *The Rat*, I cannot go one further and say I thought it was perfect. One thing missing is an "Are you sure?" feature. My son accidentally wrote over some of his hard work by saving a screen with a name that had already been used, and there was no recovery. Another feature that's absent is a way to exit the program without turning off the computer. With such a good program, this seems a rather crude way of exiting. Also, I think the manual could be expanded, and a few sample pictures would be a nice addition.

After all the pros and cons are tallied, I still think this is the best and easiest of all the graphics packages I have used or seen. I can tell you how good the package is, but you will not really appreciate *The Rat* until you see and work with it. I cannot wait to see someone who is good at drawing turn in a picture for the CoCo Gallery using *The Rat*. If you are thinking of buying another graphics package, just wait until you've seen this one. If you think you are not at all interested in owning a graphics package, I'll bet you'll change your mind. Once you've seen *The Rat*, Diecom will probably get some of your money.

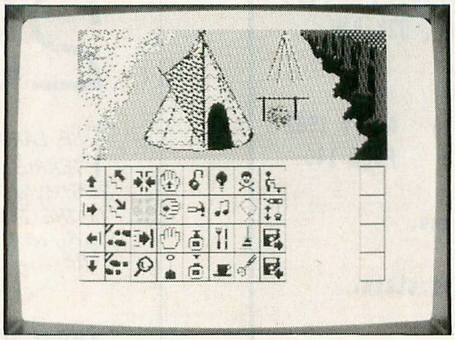
(Diecom Products Inc. 6715 Fifth Line, Milton, Ont., Canada L9T 2X8, 416-878-8358; $69.95 U.S., $99.95 Cdn.)

— Dale Shell

Software CoCo 2 & 3

Indiana Jim — A Fight for Survival

Imagine yourself on a beach with a vast ocean on one side, a dense forest on the other, and a band of vicious Indians chasing you as you plunge headlong into Indian territory. This all takes place in the opening of a unique graphics Adventure, *Indiana Jim*.



When the game begins, you set out to find a way back to civilization through Indian territory, a dense forest, caves, mountains, a desert and a town.

Indiana Jim, made by Lomiq, Inc., comes on two unprotected disks, requires a joystick and works on the CoCo 2 and 3.

The manual, in my opinion, is the only real flaw in this program because it never mentions the object of the game, nor is any information given that might help with the commands. However, this game is unique in that the software can be used by anyone of any language as it is based entirely on icons and symbols. This is basically the only thing the manual tells you other than the loading procedure for single or dual drives and the warranty information. The manual, written in English, Spanish and French, explains the meanings of the icons that appear on the screen.

The screen is divided into two major parts. The top part is the graphics display and the bottom is the icon menu. In the menu are icons used for movement (the standard `N`, `S`, `E` and `W`) and other necessary actions for game play (`GET`, `EXAMINE`, `KILL`, etc.). Next to the icon menu is a space for the display of your inventory, which may hold no more than four objects at a time, and four boxes to show objects that were dropped on that particular screen.

The game is relatively difficult without the aid of a story line for reference, but, overall, it is most suitable for the intermediate Adventurer. I found it annoying that, in the game, you can easily die without warning. If you do need help, however, you can take a peek at the solution sheet of all 235 moves. Even if more instructions were given, accomplishing your goal would be no easy feat.

(Lomiq, Inc. CP 105, Succursale A, Jonquiere, Quebec, Canada G7X 7V8; $28.95 U.S.; $38.95 Cdn.)

— Glen Baisley

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PYRAMIX

(CoCo III only)

This 100% machine language arcade game was written exclusively to take advantage of your CoCo 3. The colors are brilliant, the graphics are sharp, and the action is hot! (See Dec. '87 review) Disk.............................. $19.95

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Become a superhero in your fight to rid the world of the evil forces of Mr. Bigg in this action adventure. The combat is hot and heavy and requires a fast joystick! (See May '87 review) Disk.............................. $19.95

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(CoCo I/II/III)

This is the long-awaited response to the huge demand for a Kung-Fu program for the CoCo. Destroy opponents and evade obstacles as you grow even closer to your ultimate objective! (See Feb. '88 review) Disk.............. $24.95

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(CoCo I/II/III)

Enter the age of monsters, magic, and adventure. Here you will search for the legendary power of White Fire throughout the Forbidden Wood and dark caverns. (See Dec. '86 review) Disk.............................. $19.95

NEW ▶▶▶ *In Quest of the Star Lord* ◀◀◀ NEW

A new animated graphics adventure for the CoCo III from the author of the Hall of the King Trilogy and Kung-Fu Dude! Enjoy the mixture of science and fantasy as you quest for the Phoenix Crossbow, the only thing that can save you in the post-holocaust world. **4 Disk sides** of adventure! Outstanding 320x200 graphics! CoCo III 128k Disk $34.95

Technical assistance: 7pm to 9pm
Orders: 9am to 9pm Eastern time
On-line orders and up to date information: Delphi's CoCo Sig

GIMMESOFT
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Received and Certified

The following products have recently been received by THE RAINBOW, examined by our magazine staff and issued the Rainbow Seal of Certification, *your assurance that we have seen the product and have ascertained that it is what it purports to be.*

The Comprehensive Color Computer Anti-Clutter Kit, a reference guide designed to supplement and condense the information in Tandy manuals, including definitions, color tables, graphics codes, memory map, peeks/pokes, explanations of error codes, etc. *Heritage House Lithographers, P.O. Box 629, Hungerford, TX 77488; $9.95.*

Laser Surgeon: The Microscopic Mission, an educational Adventure in which the player is a laser surgeon directing a healing laser probe through an injured person's body to the brain. For the CoCo 3. *Activision, Mountain View, CA 94039; $29.95. Available in Radio Shack stores nationwide.*

Mini Database, a menu-driven 32K database designed to keep track of from 50 to 100 entries. For the CoCo 1, 2 and 3. *Tothian Software, Inc., Box 663, Rimersburg, PA 16248, $14.95.*

◆**MJK**, a disk operating system featuring key repeat, full screen editor, line editor, modified editing commands and unabbreviated error messages. For the CoCo 1, 2 and 3. *CoCo Connection, 5003 B St., Philadelphia, PA 19120, (215) 457-1809; $39.95.*

RADIOLOG +3, a program designed to keep a station log for an amateur radio station; comes with a "key" for the right joystick port. *Sunrise Software, 8901 NW 26th St., Sunrise, FL 33322, (800) 628-2828, Ext. 552; $19.95 plus $2 S/H.*

REMUSIC 1.0, a music program for CoCos 1 and 2 that has now been updated for the CoCo 3. *Codis Enterprises, 2301-C Central Drive, Suite 684, Bedford, TX 76021, (817) 293-1202; $12.*

◆**RS-232 Cable and RS-232 Switcher**, an extender cable and a switcher that allows you to switch between several RS-232 devices without disconnecting them. For the CoCo 1, 2 and 3. *Radcomp Computers, 919 E. Lemon #207, Tempe, AZ 85281, (602) 894-6489; 2-way Switcher, $10; 3-way Switcher, $11.50; Extender cable, $4.*

◆**System 5**, a graphics generator that features 320-by-192 16-color graphics, pull-down and page-down point-and-click menus, full screen workspace, nine different fonts, and more. It requires 512K and is for the CoCo 3. *Elec-Soft, 803d W. 47th St., Norfolk, VA 23508, (804) 451-1255; $12.*

Telewriter-128, an updated version of the *Telewriter-64* word processor for the CoCo 3. Features include macros, print preview capability and instant online help. *Cognitech, 704 Nob Ave., Del Mar, CA 92014, (619) 755-1258; $79.95.*

Thexder, an arcade action game in which the player pilots a robot through caves, vast cargo holds and spaceship interiors to do battle with 20 types of aliens. Supplied on a ROM pack, for the CoCo 3. *Sierra On-Line, Coarsegold, CA 93614; $24.95. Available in Radio Shack stores nationwide.*

VIP Integrated Library, an integrated software system that includes *VIP Terminal, VIP Writer III, VIP Calc, VIP Database, VIP Speller* and *VIP Disk-Zap*. All programs except *VIP Writer III* work on CoCos 1 and 2. Upgrades are available. For the CoCo 3. *SD Enterprises, P.O. Box 1233, Gresham, OR 97030, (503) 663-2865; $149.95.*

Wargame Designer, a 128K menu-driven program that allows you to create your own military simulations. No programming knowledge is required. For the CoCo 3. *SPORTSware, 1251 S. Reynolds Road, Suite 414, Toledo, OH 43615, (419) 389-1515; $29.*

◆ **First product received from this company**

The *Seal of Certification* program is open to all manufacturers of products for the Tandy Color Computer, regardless of whether they advertise in THE RAINBOW.

By awarding a *Seal*, the magazine certifies the product does *exist* — that we have examined it and have a sample copy — but this *does not* constitute any guarantee of satisfaction. As soon as possible, these hardware or software items will be forwarded to THE RAINBOW reviewers for evaluation.

— Lauren Willoughby

Clubs, Clubs, Clubs

We compile a list quarterly of Color Computer Clubs because of the many requests we receive. CoCo Clubs may wish to exchange newsletters, share ideas for topics of discussion at monthly meetings, etc.

Please let us know if we have omitted any clubs and send us complete up-to-date addresses. Only those clubs that have signed our anti-piracy agreement form will appear in this listing of CoCo Clubs. Also, please notify us if you wish to add or delete any names on this list. Send your information to:

CoCo Clubs
THE RAINBOW
The Falsoft Building
P.O. Box 385
Prospect, KY 40059

— Monica Wheat

ARIZONA

Tucson Color Computer Club, Bill Nunn, 9631 E. Stella, Tucson, 85730, (602) 721-1085

CALIFORNIA

Color America Users Group, Mark Randall, 2227 Canyon Road, Arcadia, 91006, (818) 355-6111

CoCo-3 World, Fred K. Wright, 10112 Melody Park Dr., Garden Grove, 92640, (714) 534-5174

Los Angeles-Wilshire Color Computer Users' Group, Norm Wolfe, P.O. Box 11151, Beverly Hills, 90213, (213) 838-4293

United Computer Federation, (San Fernando Valley Chapter and Headquarters), Pete Ellison, 366 West Providencia Ave., Burbank, 91506, (818) 840-8902

United Computer Federation, (San Francisco Chapter), Art Murray, P.O. Box 7007, Redwood City, 94063, (415) 366-4560, BBS (415) 364-2658

United Computer Federation, (Los Angeles Chapter), Gary James, 4147 Faculty Avenue, Long Beach, 90808

United Computer Federation, (Orange County Chapter), Fred Wright, 10112 Melody Park Drive, Garden Grove, 92640

The Davis CoCoNuts, Shneor Sherman, 1818 Haussler Dr., Davis, 95616, (916) 758-3195

South Bay Users Group (S-Bug), Patricia Scheffer, P.O. Box 653, Hawthorne, 90251, (213) 532-8071

Ventura County Color Computer Club (VC4), Doug McLaughlin, Oxnard Public Library, 214 South "C" Street, Oxnard, 93030, (805) 984-4636 or BBS (805) 484-5491

Citrus Color Computer Club, Jack Brinker, P.O. Box 6991, San Bernadino, 92412, (714) 824-1866

South Bay Color Computer Users Group, John G. Say, 3117 Balmoral Drive, San Jose, 95132, (408) 923-2967

COLORADO

Colorado Color Computer Club, Lloyd Carroll, 6651 Bellaire Street, Commerce City, 80022, (303) 288-6369

The ESCO Computer Club, David E. Schulz, 1299 Harrison Street, Denver, 80206, (303) 388-6988

CONNECTICUT

The Southeast Connecticut Color Computer Users Group, Bill Gross, 30 Sycamore Lane, Groton, 06340, (203) 448-1388

DISTRICT OF COLUMBIA

Northern Virginia C.C. Club, Bruce Warner, 14503 Fullerton Rd., Dale City, Virginia 22193, (703) 690-2453

FLORIDA

Color Computer Club of Brandon, Richard Steinbrueck, 2913 John Moore Road, Brandon, 33511, (813) 681-1526

Northwest Florida CoCo Nuts, Lee Gottcher, P.O. Box 1032, Fort Walton Beach, 32549, (904) 678-8894

Alachua County Color Computer Club, Robert J. Lake, 2929 N.E. 12th Street, Gainesville, 32609, (904) 378-1993

Jacksonville Color Computer Club, William H. Brown III, 2411 Hirsch Ave., Jacksonville, 32216, (904) 721-0282

Broward County Color Computer Club, George Aloia, 2263 N.W. 65 Avenue, Margate, 33063, (305) 972-0975

South Brevard Color Computer Club, Benjamin S. Jerome, 496 Hillside Court, Melbourne, 32935, (305) 259-4609

Color-6809 Users Group, Emery Mandel, 4301 11th Avenue North, St. Petersburg, 33713-5207, (813) 323-3570, BBS (813) 321-0397

C.C. Club of Sarasota, Ernie Bontrager, 4047 Bee Ridge Rd., Sarasota, 33583, (813) 921-7510

GEORGIA

The Northeast Atlanta Color Computer Club, Joe Novosel, P.O. Box 450915, Atlanta, 30345, (404) 921-7418

The CoCo Cartel, Dennis M. Weldy, 4059 Acacia Drive, Columbus, 31904, (404) 576-5479

Atlanta Color Computer Users Group, Terry E. Love, 5155 Maroney Mill Rd., Douglasville, 30134, (404) 949-5356

ILLINOIS

Illinois Color Computer Club of Elgin, Tony Podraza, 119 Adobe Circle, Carpentersville, 60110, (312) 428-3576

Northern Illinois Color Computer Club, Kenneth Trenchard, Sr., 6145 N. Sheridan Road 30, Chicago, 60660, (312) 973-5208

Willow-Works Club, Kevin L. Adair, 5753 S. Laflin, Chicago, 60636, (312) 737-5716

Glenside Color Computer Club, Ed Hathaway, 8 W. Stevenson Drive, Glendale Heights, 60139, (312) 462-0694

Kitchen Table Color Computer Group, Robert Mills, P.O. Box 464, Hanover, 61041, (815) 591-3377

Motorola Microcomputer Club, Steve Adler, 1301 Algonquin Rd., Schaumburg, 60196, (312) 576-3044

Chicago OS-9 Users Group, John Chasteen, 480 Gilbert Drive, Wood Dale, 60191, (312) 860-2580

INDIANA

Three Rivers Color Computer Club, Eddie Nast, R.R. 3, Box 269, Angola, 46703

CoCo Program Exchange, Erik Merz, 3307 Arrow Wood Dr., Fort Wayne, 46815, (219) 749-0294

Indy Color Computer Club, Kevin S. Jessup, Sr., P.O. Box 26521, Indianapolis, 46236, (317) 873-5808

Southern Indiana Computer Club, Route 1, Box 459, Mitchell, 47446

Michiana CoCo Club, Clay Howe, 310 S. Jefferson St., Sturgis, 49091, (616) 651-4248

IOWA

CoCo Questers, Scott Bellman, 2420 Salem Court, Bettendorf, 52722, (319) 359-7702

Metro Area Color Computer Club (MACCC), David E. Hansen, 3147 Avenue J, Council Bluffs, 51501, (712) 323-7867

Mid Iowa CoCo, Terry G. Simons, 1328 48th Street, Des Moines, 50311, (515) 279-2576

Dubuque Tandy Users Group, Wesley Kullhem, 1995 Lombard, Dubuque, 52001, (319) 556-4137

KANSAS

Hutchinson Color Computer Club, John Collicott, 201 E Morgan, Inman, 67546, (316) 585-2320

KC CoCo Club, Gay Crawford, P.O. Box 11192, Kansas City, 66111, (913) 764-9413

Micro 80 Users Group, Kevin Cronister, 2224 Hope, Topeka, 66614, (913) 272-1353

Color Computer Club of Wichita, David Brimmer, 527 N. Pershing Ave., Wichita, 67208, (316) 685-9587

KENTUCKY

Perry County CoCo Users Group, Keith W. Smith, General Delivery, Hardburly, 41747, (606) 439-4209

LOCO-COCO, Jim Spillman, 2405 Woodmont Dr., Louisville, 40220, (502) 454-5331

The Basic Byte, Don Henderson, 152 Patty Lane, Florence, 41042, (606) 371-9368

Hardin County Color Computer Club, Paul W. Urbahns, 2887 Republic Ave., Radcliff, 40160, (502) 351-4757

LOUISIANA

Cajun CoCo Club, Rick Herbert, P.O. Box 671, Crowley, 70526, (318) 788-3148

The CoCo Sig, Christopher Mayeux, 20 Gibbs Drive, Chalmette, 70043, (504) 277-6880

MAINE

Western Maine Color Computer Club, Michael Newell, Box 780, Bethel, 04217

Tandy Computer Club, Delmer Cargill, P.O. Box 428, Westbrook, 04092, (207) 854-2862

MARYLAND

Arkade, John M. Beck, 3513 Terrace Drive #D, Suitland, 20746, (301) 423-8418

MASSACHUSETTS

The Computer Connection, Ken Ferreira, 21 George St., Oxford, 01540, (617) 987-0197

Greater Boston Super Color Users Group, Robert Biamonte, 6 Boulder Drive, Burlington, 01803

CLUB 6809, Jean Salvas, 204 East Street, Springfield, 01104, (413) 734-5163

MICHIGAN

Color C.H.I.P.S., Jack Pieron, 3175 Oakhill Place, Clarkston, 48016, (313) 627-4358

Tandy Users Group of Grand Rapids, Robert M. Worth, Jr., 1726 Millbank S.E., Grand Rapids, 49508 (616) 245-9324

Greater Kalamazoo Color Computer Club, Jim Rix, 1835 Chevy Chase Blvd., Kalamazoo, 49008, (616) 344-7631

Greater Lansing Color Computer Users Group, P.O. Box 14114, Lansing, 48901

Michiana CoCo Club, Clay Howe, 310 S. Jefferson St., Sturgis, 49091, (616) 651-4248

Color Computer Owners Group, Charles Van Ark, c/o DSL Computer Products, Inc., 4950 Shaefer, Dearborn, 48126, (313) 582-8930

MINNESOTA

Gallifrean Recall Circuit, Dr. Who Fan Club/Newsletter, Robert Hermanek, 216 Cardinal Ct., Chaska, 55318, (612) 448-7911

Northern Minnesota CoCo Community, David B. Smith, 4112 Trinity Road, Duluth, 55811, (218) 726-0511

MISSISSIPPI

Singing River C.C. Club, James F. Wilson, 2619 Wilson Ave., Pascagoula, 39567, (601) 762-4318

Gulf Coast Color Computer Assoc., Ed Keels, 22 Christy Cove, Gulfport, 39503, (601) 832-1210

Jackson Color Computer Club, Dorothy N. Welch, 424 Church Street, Madison, 39110, (601) 856-7255

CoCo Art Club, Joel Bunyard, Rt. 16, Box 11, Meridian, 39301, (601) 483-0424

MISSOURI

North County 80 Group, Tom Vogel, 12 Ville Donna Ct., Hazelwood, 63042, (314) 739-4078

Mid-America Color Computer User's Group, Jerry Morgon, 807 Ponca Drive, Independence, 64056, (816) 796-5813

Coconuts, Steve Knittel 1610 N. Marlan, Springfield, 65803, (417) 485-3419

Mako TRS-80 & Tandy Users Group, David Morgan, 622 Porter, Joplin, 64801, (417) 781-6546

NEBRASKA

Siouxland Color Computer Club, Alan Pedersen, 611 D Street, South Sioux City, 68776, (402) 494-2284

NEVADA

C.A.T. F.U.N., Paul A. Osborne, 201 Miners Road, Fallon, 89406, (702) 423-5789

NEW JERSEY

West Orange CoCo Club, Gregg Favalora, 12 Blackburne Terrace, W. Orange, 07052, (201) 736-1748 (let ring 12 times)

Mercer County Color Computer Users Group, Richard C. Kelly, 1904 Country Lane, W. Trenton, 08628, (609) 883-9270

NEW MEXICO

Chaves County Color Computer Club, Harry Machen, 18 Forest Drive, Roswell, 88201,

CoCo Users Group, David M. Hutchison, 732 Landman Pl. NE, Albuquerque, 87123, (505) 294-4732

The Curry County CoCo Club, Ron Bull, 100 Conestoga Trail, Clovis, 88101, (505) 763-4713

NEW YORK

Adirondack CoCo Club (Albany Chapter), Ron Fish, Box 4125, Albany, 12204, (518) 465-9793

Adirondack CoCo Club, (Greene County Chapter), Pete Chast, P.O. Box 61, Athens, 12015, (518) 945-1636

Adirondack CoCo Club (Glens Falls Chapter), Richard Mitchell, 39 Center St., Fort Edwards, 12828

The Island CoCo Club, D.K. Lee, P.O. Box 426, Massapequa Park, 11762, BBS (516) 277-1285

Kings Byte CoCo Club, Morty Libowitz, 1063 East 84th St., Brooklyn, 11236, (718) 763-4233, BBS (718) 837-2881

C.C. Club of Central N.Y., Joseph Short, 248 S. Fourth Ave., Ilion, 13357, (315) 895-7730

Rockland County Color Computer Users Group, Harold L. Laroff, P.O. Box 131, Monsey, 10952-0131, (914) 425-2274

Metropolitan Color Computer Users Group, Danny Iacovou, 21-36 42 St., Astoria, 11105, (718) 204-4770

Olean Area CoCo Users Group, Herman L. Smith, P.O. Box 216, Olean, 14760, (716) 933-7488, BBS (716) 933-7489

Twin Tiers CoCo Club, William Cecchini, 319 Irvine Place, Elmira, 14901, (607) 734-0065

The Rochester S-80 Computer Club, Inc., Gary Panepinto, P.O. Box 15476, Rochester, 14615, (716) 392-6133

New York Color Computer Group, Bill Bergadano, Box 140626, Staten Island, 10314, (718) 761-0268

Broome CoCo Club, Lloyd Shotwell, 18 Adaline Street, Owego, 13827, (607) 687-3231

NORTH CAROLINA

Bull City CoCo Users Group, Todd Wall, 5319 Durand Drive, Durham, 27703, (919) 598-1348

Raleigh Color Computer Club, Pete Katz, 505 Berkshire, Garner, 27529

OHIO

Central Ohio Color Computer Club, Jim Upperman, 5201 Wilcox Road, Amlin, 43002, (614) 876-1767

Color Computer Club, Inc., William Wills, P.O. Box 468, Canfield, 44406

Dayton Color Computer Users Group, Steven E. Lewis, 4230 Cordell Dr., Dayton, 45439, (513) 299-3060

Dayton Area Color Computer Users Group, David R. Barr, 2278 Yorkshire Pl., Kettering, 45419, (513) 293-2228

Greater Toledo Color Computer Club, Robin Jackson, 2053 Eileen Road, Toledo, 43615, (419) 531-4549

Tri-County Computer Users Group, William J. Loeffler, 2612 Dale Avenue, Rocky River, 44116, (216) 356-0779

Miami Valley CoCo Club, Tim Ellis, 1805 W. Parkway Dr., Piqua, 45356, (513) 773-2244

OKLAHOMA

Central Oklahoma Computer Organization, Inc., Martin Schiel, 5313 Spitz Drive, Oklahoma City, 73135, (405) 670-6891

Green Country Computer Association, Michael Keller, P.O. Box 2431, Tulsa, 74101, (918) 245-3456 (data)

Central Oklahoma Computer Organization Inc., Enid Chapter, Jim Sands, 706 South Grand, Enid, 73701, (405) 237-5949

PENNSYLVANIA

HUG-A-CoCo, George Lurie, 2012 Mill Plain Court, Harrisburg, 17110, (717) 657-2789

Penn-Jersey Color Computer Club, P.O. Box 2742, Lehigh Valley, 18001

Williamsport Area Color Computer Club, John M. Rymell, R.D. 3, Box 182, Muney, 17756, (717) 546-2721

The CoCo Exchange Club, Daniel Moore, 617 Prescott Avenue, Scranton, 18510, (717) 961-0535

Skyline Color Computer Club of Berks County, Lewis F. Brubaker, 4874 Eighth Ave., Temple, 19560, (215) 921-3616

Pittsburgh Color Group, Ralph Marting, 309 Frazier Dr., Pittsburgh, PA, 15235

The Hollidaysburg Area Color Computer Club, Bill Smith, P.O. Box 101, Roaring Spring, 16673, (814) 224-5280

The Monthly CoCo Newsletter, Dino DiEnno, 715 So. Hutchinson, Philadelphia, 19147, (215) 923-2454

Philadelphia Area Computer Society (PACS) Color Computer Special Interest Group (SIG), Robert Toscani, LaSalle University, 19th & Olney Sts., Box 312, Philadelphia, 19141, (215) 567-4276 (Arnie Weiss)

RHODE ISLAND

New England COCONUTS, P.O. Box 28106, North Station, Providence, 02908

SOUTH CAROLINA

LoCo CoCo Club, Larry Coyle, 4334 Flynn Dr., Charleston, 29405, (803) 747-0802

Midlands 80 Computer Club, Frank Eargle, P.O. Box 7594, Columbia, 29202, TBBS (803) 791-7389

Spartanburg County CoCo Club, Jesse W. Parris, 152 Bon Air Ave., Spartanburg, 29303, (803) 573-9881

TENNESSEE

Tri-Cities Computer Club, Gary Collins, P.O. Box 4506 CRS, Johnson City, 37602-4506, (615) 929-1862

Foothills Micro-Computer Club, Aaron Sentell, P.O. Box 1541, Maryville, 37801, (615) 982-4629

Memphis Color Computer Users Group, Logan R. Ward, 5512 Poplar, Memphis, 38119, (901) 685-0009

TEXAS

Alamo Color Computer Club, P.O. Box 690256, San Antonio, 78269, (512) 699-6027

The Codis CoCo Symphony, William C. Garretson, 828 Gregory Avenue, Bedford, 76022, (817) 283-8571

UTAH

Salt City CoCo Club, Dennis Mott, 720 E. Browning Ave., Salt Lake City, 84105, (801) 487-6032, BBS (801) 487-6787

VIRGINIA

Northern Virginia C.C. Club, Bruce Warner, 14503 Fullerton Rd., Dale City, 22193, (703) 670-4962

Central Virginia Color Computer Club, Roger Lee, Rt. 2 Box 175, Madison Heights, 24572

Color Company, Rick Blouin, 12007-C3 Greywing Sq., Reston, 22091, (703) 860-9297

Richmond Area Color Computer Organization, William Mays, 6003 Westbourne Drive, Richmond, 23230, (804) 282-7778

WASHINGTON

Northwest Computer Club, Lin Shapel, East 1812 Rockwell, Spokane, 99207, (509) 487-8365

Mount Rainier Color Computer Club, Ron Amos, 2450 Lenore Drive N., Tacoma, 98406, (206) 752-8735

Tri-Cities Color Computer Users' Group/OS-9 SIG, Jim Vestal, P.O. Box 1213, Richland, 99352, (509) 943-4832

WEST VIRGINIA

Ohio Valley Association of Computers, Bill Davis, 1142 Courtland, Weirton, 26062, voice (304) 797-8321, data (304) 797-8671

Blennerhassett CoCo Club, David Greathouse, 1306 Wells Circle, Parkersburg, 26101, (304) 424-7108

WISCONSIN

Southern Wisconsin CoCo Club, David C. Buehn, 24607 67th Street, Salem, 53168, (414) 843-3830

CANADA

ALBERTA

Bonnyville User Group (BUG's), Doug MacDonald, Box 2071, Bonnyville, Alberta, T0A 0L0, (403) 826-4790

The Calgary Color Computer Club, P.O. Box 22, Station M, Calgary, Alberta, T2P 2G5

Edmonton CoCo Users Group, Dexter Dombro, P.O. Box 4507 Stn. South, Edmonton, Alberta, T6E 4T7, (403) 439-5245

BRITISH COLUMBIA

Vancouver Colour Computer Club, Box 76734, Stn S, Vancouver, British Columbia, V5R 5S7

Salmon Arm CoCo, David Coldwell, RR #4, Site 26 Comp. 13, Salmon Arm, British Columbia, V1E 4M4

MANITOBA

Winnipeg Micro-80 Users Group, Sid Chapnick, 1755 King Edward St., Winnipeg, Manitoba, R2R 0M3, (204) 338-1295

NEW BRUNSWICK

Campbellton 6809E Users Group, Blaine Arsenault, 80 Deny Street, Atholville, New Brunswick, E0K 1A0, (506) 753-4769

Moncton Color Computer Users Group, Robert E. McLaughlin, 73 Lewis Street, Moncton, New Brunswick, E1C 4S5, (506) 855-3860

NOVA SCOTIA

Color Trading Post, Lee A. Sutton, P.O. Box 565, Bridgetown, Nova Scotia, B0S 1C0

Halifax Dartmouth CoCo Users Group, Eugene Naugler, P.O. Box 572, Dartmouth, Nova Scotia, B2Y 3Y9

Colour Computer Halifax User Group (CoCo Hug), Paul A. Power, 6354 London St., Halifax, Nova Scotia, B3L 1X3, (902) 455-6341

ONTARIO

ESSA Color Computer Club, David Morrow, 10 Berwick Cres., Angus, Ontario, L0M 1B0, (705) 424-6985

Kingston CoCo Club, Kenneth Bracey, 316 Westdale Ave., Apt. 4-C, Kingston, Ontario, K7L 4S7, (613) 544-2806

K-W CoCo Club, P.O. Box 1291, Station C, Kitchener, Ontario, N2G 4G8

London CoCo Nuts Computer Club, Harry K. Boyce, 180 Concord Road, London, Ontario, N6G 3H8, (519) 472-7706

Niagara Regional CoCo Club, Gerry Chamberland, 6843 Cumberland Crt., Niagara Falls, Ontario L2H 2J9, (416) 357-3462

Ottawa 6809 Users Group, Norm Shoihet, 1497 Meadowbrook Road, Ottawa, Ontario, K1B 5J9, (613) 741-1763

Sarnia Computer Users Group, J. Verdon, P.O. Box 1082, Sarnia, Ontario, N7T 7K5, (519) 344-6985

Burlington Color Computer Users Group, Lawrence T.J. Coffey, 33 Drakes Drive, Stoney Creek, Ontario, L8E 4G4, (416) 573-6889

Durham 80-C Computer Club, Tony Kernohan, P.O. Box 95, Whitby, Ontario, L1N 5R7, (416) 728-6416

Trenton Colour Cats, Perry Skipton, 21 Janlyn Cres Appt. 5, Belleville, Ontario, K8N 1L1, (613) 966-9291

The Toronto Color Computer Club, John T. Rawlinson, #361 St. Germain Ave., Toronto, Ontario M5M 1W6, (416) 782-5718

Gateway Colour Computer Club, Jim Ross, P.O. Box 492, North Bay, Ontario, P1B 8J1, (705) 472-4931

QUEBEC

Club d'Ordinateur Couleur du Quebec, Inc., Centre de Loisirs St-Mathieu, 7110- 8e Ave., St-Michel, Montreal, Quebec, H2A 3C4, (514) 729-8467

Club Micro Ordinateur de Montreal-Nord, Christian Champagne, 12365 Blv. Langelier #7, Montreal-Nord, Quebec, H1G 5X6, (514) 323-5958

Les CoCophiles, Robert Chartrand, 17 Bord-de-l'eau, Repentieny, Quebec, J6A 3K2, (514) 581-1385

Club ORCO-RS, Jacques Bedard, 33 Lisiere, St-Constant, Quebec, J0L 1X0, (514) 632-4311

Club CoCo APPE, Andre Patenaude, 10870 Bois de Boulogne, Montreal, Quebec, H3M 2X1, (514) 331-8418

SASKATCHEWAN

Saskatoon Color Computer Club, L. Curtis Boyle, 35 Bence Crescent, Saskatoon, Saskatchewan, S7L 4H9, (306) 382-1459, BBS (306) 384-8040

FOREIGN

ARGENTINA

Freecoco Club, Novoa, Miguel Angel-Ing. Duarte, Omar, Mendez de Andes 799, Buenos Aires, Capital Federal 1405, Argentina, phone 431-2501

AUSTRALIA

Blacktown City TRS-80 Colour Computer Users Group, Keith Gallagher, P.O. Box 264, Riverstone, New South Wales, 2765, Australia, (02) 627-4624

COCOPUG, Harry Murphy, 8 Lois Court, Regentsville, New South Wales, Australia, 2750

CoCoHUG (Color Computer Hobart Users Group), Robert Delbourgo, 15 Willowdene Avenue, Sandy Bay, Hobart, Tasmania, Australia 7005

Sunshine Color Computer Club, Stephen Jones, P.O. Box 111, Sunshine, Victoria, Australia, 3020

Pine Rivers/Peninsula User Group, B. Clarke, C/-31 Brooks Rd., Bray Park, Queensland, Australia, 4500, (07) 205-4879

Australian Christian Users Group, Lieutenant Raymond L. Isaac, 57 Wittenoom Street, Collie, Western Australia 6225, phone (097) 34-1578

COLOMBIA

CoCo-Byte, Fabian A. Rodriguez, Avenida 4A #49N-60 or A.A. 5976, Cali, Colombia, 640705-649165

ISRAEL

The Mid-East CoCo Club, J. Yosef Krinsky, 526/11 Kiryat Kaminitz — Neve Yaacov, Jerusalem, Israel

MEXICO

Mexcoco Users Group, Sergio Waisser, Paseo de la Soledad #120, Mexico City, D.F., 53920, Mexico, phone 294-36-63

First Color Computer Users Group of Hermosillo, Arturo Fernandez Diaz-Gonzalez, Javier de Leon No. 708, Colonia Pitic, Hermosillo, Sonora, Mexico

the NETHERLANDS

Color Computer Club Benelux, Jorgen te Giffel, Eikenlaan 1, 4641 GB Ossendrecht, the Netherlands

CoCoCE, J. Slaats, Chopinlaan 11, 5653 ET Eindhoven, the Netherlands, (040) 512-222

PERU

Piura Color Computer Club, Carlos Alvarez, Box 142, AV. Guillermo Irazola, J-6 URB. Miraflores Castilla, Piura, Peru, phone (074) 327-182

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Puerto Rico Color Computer Users Club, P.A. Torres, Cuernavaca 1699, Venus Gardens, Rio Piedras, Puerto Rico 00926, Phone (137) 755-7598

WEST GERMANY

First CoCo Club Hamburg, Theis Klauberg, Krietkamp 27A, Hamburg 65, West Germany, 2000, (040) 536-3676

The Greatest German CoCoCooks, Michael Herbes, Dorfstr 23, 4320 Hattinger, West Germany

new clubs

ALABAMA

Cocoist of Central Alabama (CoCoA), Phil Shanholtzer, Rt. 4 Box 489 BB, Prattville, 36067, (205) 365-3501

LOUISIANA

Bayou Country Color Computer Club, Darrin J. Martin, 3206 Susan St., Houma, 70363, (504) 851-4014

OHIO

Ohio Valley Association of Computers, Bill Davis, 142 Courtland, Weirton, 26026, (304) 797-8321 and (304) 797-8671 (online)

The Utopia Network, Bruce Uher, 145½ Park Ave., P.O. Box 1274, Coshocton, 43812, (614) 622-4061

OREGON

Computron Research User's Group, Tom Sanders Bair Jr., P.O. Box 370, Clackamas, 97015, (503) 668-8397, BBS

TENNESSEE

Bradley County Personal Computer Users Group, C.A. Bailey, P.O. Box 2611, Cleveland, 37311, (615) 344-3950

VIRGINIA

Southwestern Va. Color Computing Club, Richard Sutphin, Rt. 1 Box 20, Henry, 24102, (703) 365-2018

WEST VIRGINIA

Huntington Area Color Computer Symposium, Jim Bush, P.O. Box 391, Lesage, 25537-0391, (304) 736-5314

WYOMING

Cheyenne CoCo Club, Craig Sullivan, 4500 Parkview Drive #303, Cheyenne, 82009

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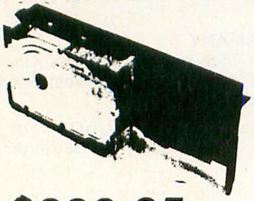

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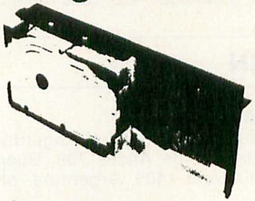

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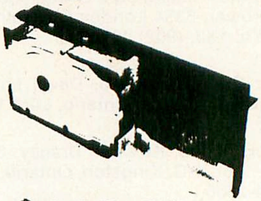

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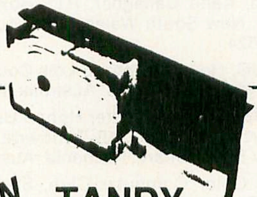

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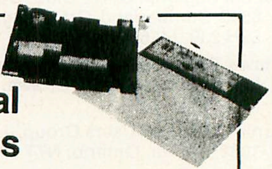

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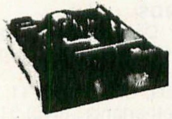

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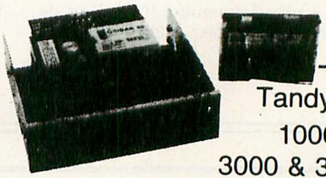

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The CoCo Power User

By Alan J. Corson

Power User: the phrase conjures up visions of a Pierre Cardin-bespeckled, Gucci-shod, silk- and tweed-clad micro guru, crunching away on massive spreadsheets, sorting and searching huge databases, and amalgamating all with his instant spell-checking, thesaurus-spouting, automatic outlining, window-framing word processor running on his $10,000, 4-Mb, 12-MHz Belchfire Turbo 386. Phew! This is the image of the Power User that has been touted within the MS-DOS and Macintosh corporate worlds. How can our humble little CoCo 3 ever measure up to supporting such an image? It can, with a whole lot less fuss, bother and, above all, cost!

With its simple beginnings in 1980, the 4K CoCo began introducing a whole new world of computing to many individuals who only 10 years earlier had their sole programming experience on large, intimidating, remote batch-oriented multi-megabuck mainframes. With its limited memory, the CoCo could not then compete as a business system. As memory technology advanced, however, the CoCo's memory also grew to its 64K-addressable limit. But to get to that memory, something else had to be provided to overcome the 32K limitation hard-coded into Color BASIC.

Alan Corson, an Air Force major presently serving in Cairo, is an information systems engineer who sees a growing market for the CoCo as a small-business machine.

The folks at Microware and Tandy had the answer: OS-9 Level I, a proven operating system already running on 6809 machines across the country in real-time process control applications, a very demanding industrial environment. Modeled after UNIX (with some very smart improvements in efficiency), OS-9 provided access to all of the CoCo's memory, plus a whole lot more: tree-structured hierarchical filing systems, extremely flexible input/output capabilities, multitasking and multiuser features. By the way, all these capabilities were (and still are) available for under $100 from Radio Shack, 10 times less expensive than UNIX (actually XENIX, the PC version of mainframe UNIX).

In 1983, OS-9 with a 64K CoCo was a whole lot of computing horsepower, but with very little applications software available. "Little feller" was still relegated to acting as a development machine in homes or as an educator in schools. However, dedicated CoCo-Nuts perceived a need and over the next three years, small-business-oriented software began to appear: *Telewriter*, the VIP series, and the Elite series, all under RS-DOS. Then OS-9 products followed: *DynaCalc, Data Bank* (licensed as *Profile* by Tandy), *DynaStar, Stylograph*, the X-series from Microtech, and the Business Application series from Computerware.

All along, our archetypical Power User still turned up his nose at the CoCo because of the memory limitations imposed by the 16-bit address-bus limitation of the 6809. (One fact still escapes the 80XX community: The 6809 internally is a 16-bit processor, fully as capable as an 8088, with a RISC-like (Reduced Instruction Set Computer) machine language. In July 1986, Tandy shattered the memory limitation with the announcement of the Color Computer 3: 128K RAM, expandable to 512K, and able to run OS-9 Level II at 2 MHz. Software developers scrambled to update their software to use the windowing facilities of Level II, but the vast majority of OS-9 software would still run without major modification, thanks to the stringent software-developers standards inherent within the OS-9 environment. Those standards produced compact, modular, relocatable, re-entrant code.

Now the CoCo 3 has the hardware, the operating system, and the applications software capable of supporting a potential Power User. How do I know? I *am* one! Yes, I'm the proud owner of a 512K CoCo 3 liberally stuffed with RGB monitor, two DSDD drives, one DSQD 80-track drive, MPI, RS-232 Pak, and a Disto 512K Super RAM Disk Pak. I use this system daily at work, cruisin' with my CoCo while my MS-DOS compatriots are steaming and fussing on their -XT "boat anchors." How do I accomplish this, and how do I qualify as a Power User? Stick around, and watch the magic of OS-9 Level II harness for work!

Each morning when I fire up "Euclid" (my CoCo 3), in goes a Level II System disk with three procedure files: `StartUp`, `ColdStart` and `Wset`. `StartUp` starts the clock, initializes my system and custom-configures it for my use. `ColdStart` formats and loads up the RAM disk with all my executable files (about 382K worth) from a floppy disk image loaded in the 80-track drive (`/d2`). Next, the simple file `Wset` starts the real Level II magic. Here it is:

```
chx /r0/cmds
chd /r0
wcreate -z
/w1 -s=2 00 00 80 24 03 02 02
/w2 -s=2 00 00 80 24 05 02 02
/w3 -s=2 00 00 80 24 07 02 02
/w4 -s=2 00 00 80 24 05 02 02

shell i=/w1&
shell i=/w2&
shell i=/w3&
shell i=/w4&
```

Kinda cryptic, isn't it? Not to worry, a short perusal through the OS-9 Level II Operating System Manual "Getting Started" and "Windowing System" sections will make it all clear (really!). Allow me to help: First, Euclid switches to his fast-access RAM Disk, `/r0`, then invokes the windowing utility `Wcreate`. The next four lines tell `Wcreate` to set up four windows, each 80 columns by 24 lines. Each window will have black borders and black backgrounds. The foreground colors will be green, amber, blue and amber, respectively. This gives me four different "terminals": Green, amber, blue and amber (again). A carriage return tells `Wcreate` that it is finished, and the last four lines set up shell environments in each of the windows.

I now have four CoCos at my disposal, each displaying an 80-column screen in a different color. Let's call them `/w1`, `/w2`, `/w3` and `/w4`. Actually I have five, because the basic green screen (known as `/term`, or the hardware screen) is always available to return to, should I need it for System Operator housekeeping functions. In fact, that is the screen I'm still looking at after `Wset` gets finished. So, if I press the CLEAR key once, I am in `/w1`, a green on black terminal displaying the OS9: prompt of an active shell. I start up a word processor here, Computerware's *Screen Star*. Five seconds later, *Screen Star*'s opening help menu is visible, waiting for commands. If I press the CLEAR key again, I'm in `/w2` now, an amber terminal, and I'll start up my communications package, *Color Connection III*. Press the CLEAR key again, and I'm in `/w3`, a bright blue (cyan) on black terminal (interesting combination, but still very readable). Here I need my spreadsheet, and *DynaCalc* comes to life. One more press of the CLEAR key and `/w4` appears: *Profile*, my database application, is started. Now, with the CLEAR and SHIFT-CLEAR key combinations at my disposal, I can instantly switch between word processing, data communications, spreadsheet operations, or database work. How much memory am I using for all this? I'll ask my SysOp, `/term`. CLEAR key to all green, and enter the command `mfree`. Euclid responds with the following:

```
Blk Begin  End   Blks  Size
--- ----- ----- ----- -----
 24 48000 77FFF   18   192k
                 ===  ====
        Total:    18   192k
```

No sweat! Euclid still has 192K of RAM left over. OK, I have all this computing power at my disposal, how do I qualify as a Power User?

At my job here in Cairo, I assist the Arab Republic of Egypt's Armed Forces in developing their command, control and communications capabilities. Also, as the token communications-electronics engineer on the staff of the Office for Military Cooperation, I act as the communications officer for the agency. This responsibility calls for planning, budgeting, and managing all the "comm" assets needed to support our operations at the American Embassy. Recently we had to upgrade our radio network rather rapidly, and the word came down from "on high": "Al, you have $20,000 to spend, but you must do it in five days."

OK, Euclid, let's rock and roll! First, a *DynaCalc* spreadsheet to cost out alternatives and decide on the best solution. Next, a search of the *Profile* spares database and personnel listing to find out how much extra equipment to order. Switch back to the spreadsheet and add the quantities. Save that spreadsheet to a file. Finally, prepare letters to the procurement people with *Screen Star*, merging the spreadsheet file into the letter to provide quantities, part numbers, and total estimated costs. Total time spent? Two days, with the majority of the time spent researching catalogs and obtaining current price information. Result: Money effectively spent quickly to meet a critical time-sensitive need. Am I so great? No, but Euclid, OS-9 and a whole host of CoCoNut software programmers sure made me look good!

What is my point here? Simply that the CoCo 3 has "arrived" as an effective small-business office automation tool. Euclid's ability to instantly switch among the three major business applications of word processor, spreadsheet and database allowed me to seamlessly construct a product, with no breaks in thought or action. That is Power User computing, and throughout this process, Euclid wasn't even breathing hard! When I switched from one task to another, the first task was "marking time" as I worked on the second task. With the Belchfire 386, that's normal. With Euclid, that's a waste! If I had been really good, (and my spreadsheets and databases were big enough), Euclid could have been recalculating a spreadsheet, searching a database, and listening for my fumbling fingers with the word processor, all at the same time!

Yes, there are many other systems able to do the same thing, but Euclid (or any other similarly equipped CoCo 3) can support this type of Power User computing for under $1,500. MS-DOS can't match that; XENIX, OS/2, Concurrent DOS 386 can't match that; *DesQview, GEM* or Microsoft *Windows* can't match that on any 80XXX-based system on the market today.

With such an elegant solution at hand here, any engineer would first test for the optimum (which I feel has been successfully demonstrated here), then generalize the solution. Remember the multiuser capabilities inherent in OS-9? With `Login` patched from OS-9 Level I to Level II (courtesy of Greg Law, as reported by Mssrs. Esposito and Libra in their "Doctor ASCII" column, November 1987) and `Tsmon` activated, a second user can be added via an RS-232 port and an inexpensive terminal . . . . I'm getting ahead of myself. That is a subject worthy of an entire article.

From Cairo, Egypt — *maa' salaama*, y'all!

(Questions or comments may be directed to the author at AMEMB/OMC-AV, Box 29, FPO NY 09527-0051.)

Lack of Infinite Precision

I have an 'E' board CoCo, which I have upgraded to 64K. Since the upgrade, my CoCo no longer subtracts correctly. The problem seems to occur when I use variables to store the numbers. For example, if I set `A=$123.49` *and* `B=$56.89` *then subtract* `B` *from* `A`*, I might get $66.60 or something like $66.590003. Are my suspicions about the upgrade correct or am I way out in left field?*

Richard Jones
Quincy, IL

℞ The problem is not related to your upgrade, but to decimal-binary floating-point conversion and lack of infinite precision. Decimal fractions 0.1, 0.01, etc., are repeating binary fractions and, on occasion, some of the digits get lost. This is analogous to using pencil and paper to divide 10 by 3, yielding 0.33. If you then multiply 0.33 by 3, you get 0.99, *not* 1.0. If infinite precision were possible, in both cases, the results would be exact. In your programs, use `PRINTUSING` instead of `PRINT` and round the results to help alleviate this problem.

If You Fall Into an Error Trap

I have a new CoCo 3 with DOS 1.1. While recently experimenting with the error-trapping routine, I found that an FC Error comes up as Error Number -1. My manual says it is Error Number 4 and that Error Number -1 does not exist. What gives?

Doug Lute
Clymer, PA

℞ I assume you were using an `IF` statement. On the CoCo and other computers such as the IBM PC and Apple II, which use Microsoft BASIC, the logical value `TRUE` is a -1.

Richard Esposito is a principal engineer with BDM Corp. He holds bachelor's, master's and doctorate degrees from Polytechnic Institute of Brooklyn. He has been writing about microcomputers since 1980.

Richard Libra is a simulator test operator for Singer Link Simulation Systems Division.

DOCTOR Q&A ASCII

By Richard E. Esposito
Rainbow Contributing Editor
with Richard W. Libra

Controller Restrictions

When it is stated that a program cannot run with the disk controller plugged in, does that mean there isn't enough memory for the computer to run the program and work the disk drive, or does that mean the program has some machine language coding in it that cannot work if the controller is plugged in?

Omri Goren
Reseda, CA

℞ Unfortunately, I cannot give you a blanket rule; it could be either.

High Poking Disk BASIC 1.1

I read recently about someone whose Disk BASIC 1.1 would accept the high speed poke without any trouble when doing input and output. I also have Disk BASIC 1.1, but my computer puts random characters on the screen and changes some of the program currently in memory. It also damages files on my disk. Are there any hardware fixes I can do to make the high speed poke work with my disk controller?

Jeff Bradley
Walkerville, MD

℞ The incompatibility with the 2MHz clock speed is not due to the version of Disk BASIC, but the disk controller hardware itself. The older disk controllers that required 12 volts and were designed for the CoCo 1 cannot handle this speed. If you have one of these controllers, it is best to acquire a newer controller that is rated for 2MHz. While the CoCo 3 to a large degree is software-compatible with the CoCo 1 and 2, from a hardware standpoint (although the BUSS is the same), it is a totally different machine.

Swapping Keyboards

I have a 64K CoCo 2 on which the X key no longer works. Is the keyboard matrix on the CoCo 3 keyboard the same as on the CoCo 2 keyboard? If so, can I replace it with a new CoCo 3 unit? I realize that a few new keys will not be recognized by the CoCo 2, but that is not a problem.

Ronald Landwehr
Wheeling, IL

℞ The CoCo 3 keyboard (Radio Shack Part No. AXX-0245) is a drop-in replacement for a CoCo 2. If used with an older CoCo 1, an adapter for the mylar cable may be required.

Misalignment Messes Communication

I have a 512K CoCo 3 and two disk drives. I have found that head alignment on one drive can get so far out that programs saved on one drive cannot be read on the other. This fact is not immediately obvious; the problem first appears in "backup" failures, but only erratically. Will the J&M Systems "Precision Alignment Disk & Memory Minder Manual S/S" advertised in THE RAINBOW allow me to do the head alignment required to keep this problem under control?

Ralph C. George
Anchorage, AK

℞ If the problem is misalignment, the kit will help; but if it is a chronic problem, the money would be better spent in buying a newer replacement drive. This is especially true if the drive is one of the original, gray-housed RS full-height drives made by T.E.C.

Accessing 64K

I have a 64K CoCo 2 (32K RAM) and a cassette drive. Do I need to install a chip upgrade in order to get the full 64K RAM?

Paul Demick
Stephentown, NY

℞ Access to more than 32K, when using even a 512K CoCo 3, is limited not by the hardware but by the ROM software.

Searching for the Elite

About five years ago I purchased the program Elite * File *from Radio Shack, but I can no longer find documentation for it. Would you happen to have the address for Elite Software, Inc.?*

Mike Brunkow
St. Joseph, MO

℞ As of March 1986, the address of Elite Software was 201 Penn Center Blvd., Pittsburgh, PA 15235, (412)795-8492. Advertisements for their software last appeared in THE RAINBOW in that month.

80-Column Boot-Up in *Multi-Vue*

I was disappointed with Multi-Vue *in that the system boots up in 40-column mode. Is there any way to fix this?*

Joel Gray
Baton Rouge, LA

See pg 159

℞ Thanks to Kent Myers, changing Offset $3A99 of `GShell` from $06 to $07 will make the default 80 columns.

2 Into 3 *Might* Go

Is there a way to upgrade my 64K CoCo 2 to 512K and make the language compatible with the CoCo 3?

Jason Lattimer
Canal Winchester, OH

℞ J & R Electronics can supply you with their 512K *Banker II* upgrade for your CoCo 1 or CoCo 2, but with it, you will need custom software for the extra memory as it is not mapped in the same way as on the CoCo 3. Unless you write your own, the supplied software allows the extra memory to be used as a print spooler and/or a RAM disk. RAM disk software for OS-9 Level I is also included.

A New Hybrid: The Cocatari?

Is there a way to connect the port on the CoCo 2 to the port on the Atari 2600 and be able to operate in Atari BASIC?

William Mikrut
Chicago, IL

℞ Even if the hardware interface were worked out, it would do you no good. The Atari uses a 6502 microprocessor while the CoCo uses a 6809E, and they have different machine language instruction sets.

For a quicker response, your questions may also be submitted through RAINBOW's CoCo SIG on Delphi. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type `ASK` for "Ask the Experts" to arrive at the EXPERTS> prompt, where you can select the "Doctor ASCII" online form which has complete instructions.

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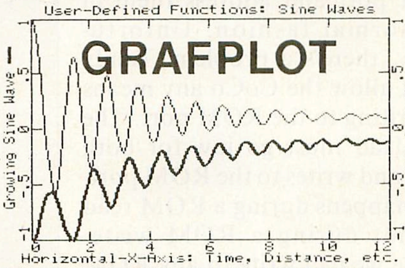

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"I cannot imagine the CoCo 3 without ADOS-3; it would not be a complete machine."
The RAINBOW, July 1987

You've moved up to a CoCo 3. A powerful new machine. Now, it's time to give BASIC a shot in the arm, with ADOS-3. Wouldn't it be nice to turn on your machine and be greeted by an 80-column display, in the colors of your choice, with your own custom startup message? To run routinely at 2 MHz (double speed) without having to slow down for disk and printer operations? This and much, much more is possible with ADOS-3, our CoCo 3 adaptation of the acclaimed original ADOS, which shares the original's virtual 100% compatibility with commercial software. After customizing ADOS-3 using the provided configuring utility, you can have it burned into an EPROM that plugs into the Disk BASIC ROM socket, or just use it in RAM as a disk utility. (EPROM + burning will cost $15-20; we provide information concerning how you can have this done.) Supports double-sided drives (35, 40, or 80 tracks). FAST and SLOW commands, auto line number prompts, RUNM command, keystroke macros, arrow-key scroll through BASIC programs, auto-edit of error line, and many more valuable features.

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A RAM pack for your CoCo ROM port

Static RAM Interface

By Dennis H. Weide

Last spring, while developing a peripheral control system for disabled persons, I ran into one small obstacle. I had to find a way to load, test and modify a program in Program Pak memory addresses $C000 through $FEFF before programming an EPROM chip. So I went to the chalkboard and designed a circuit I thought fit the bill perfectly. It worked so well, in fact, I thought others might find it useful. I call it the Static RAM Interface (SRI for short). It's an excellent hardware project for beginners and, even though it looks complicated, it's easy to build and understand. It works on any version of the CoCo, and I'm sure you'll find scores of uses for it.

Dennis Weide is a communications technician for AT&T in Albuquerque, New Mexico, where he programs AT&T and IBM PCs. He enjoys making toys and teaching programming.

The Solution

It would be nice if we could just hang a few RAM chips on the ROM port and address them in the normal fashion. Unfortunately, there's a problem: Tandy didn't allow the CoCo any means for writing to the ROM port. The CTS lead must go low for both reads and writes to the ROM port. This happens during a ROM read but not during a ROM write. Before we can write to any ROM port memory location, we must find a way to force the CTS lead low during the write cycle.

The solution is simple. Figure 1 is the schematic diagram of a circuit that develops a new CTS lead using address lines A8 through A15. To understand how it works, look at the lowest and highest memory addresses that the ROM port uses and compare them binarily.

Looking at Figure 2, we see the lowest ROM address ($C000) has only bits 15 and 14 set high. Notice that the highest address ($FEFF)

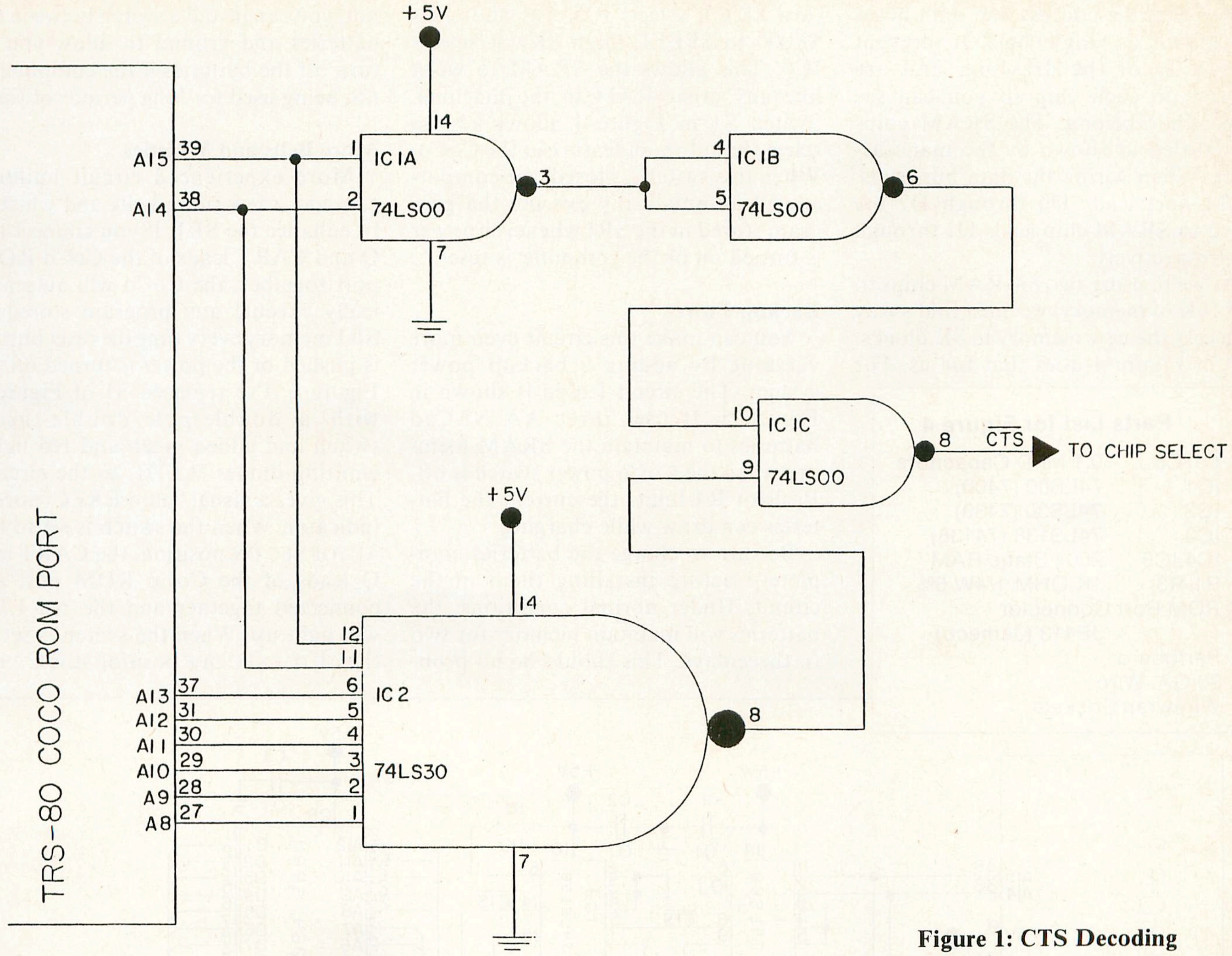


Figure 1: CTS Decoding

also has these same bits set high. Any time we try to access a ROM port address, bits 15 and 14 will be high. In Figure 1, we use these two address bits as inputs to IC1A to select the entire ROM port address range.

In the highest address ($FEFF), Bit 8 is low. We'll use this bit to determine when we're trying to access an address above the ROM port range.

For a better explanation, refer to Figure 1 again. IC1A (74LS00) is a NAND gate used to determine if bits A15 and A14 are both high. IC1B inverts the output of the previous gate (IC1A) so that we'll have the proper signal state when we need it. If either Bit A15 or Bit A14 is low, the output from IC1B will be low. If both bits are high, the output from IC1B will be high. To get the CTS lead low, both inputs to IC1C must be high. We've seen how to do this for the input on Pin 10. Now let's see how the other input works.

IC2 (74LS30) determines the high cutoff address for us. Any low input (A8 through A15) will cause a high output on Pin 8. This high is fed to Pin 9 of IC1C. If Pin 10 of this IC is also high (we've seen how to do this), the CTS output on Pin 8 will go low. If all eight inputs to IC2 go high, the output from it will go low and the CTS lead will go high. So, any time we try to access an address above $FEFF, the CTS lead will go high. This is exactly what we want, because addresses above $FEFF are outside the ROM port address range. Figure 3 is a truth table for the circuit shown in Figure 1.

Now, the Memory

As you can see, the address decoding for the CTS lead is simple. Well, the rest of the circuit is even more simple. All we do is add two static RAM (SRAM) chips (8K by 8-bit each), a high-low address decoder (74LS138) and three resistors and we're done. We use SRAM instead of dynamic RAM (DRAM) because SRAM doesn't require refreshing or address decoding and can be connected directly to the address and data buses.

LO ADDRESS

HEX	C	0	0	0
BIN	1100	0000	0000	0000

HI ADDRESS

HEX	F	E	F	F
BIN	1111	1110	1111	1111

Figure 2: ROM Port Addresses

A15	A14	74LS30 PIN8	$\overline{\text{CTS}}$
L	L	L	H
L	L	H	H
L	H	L	H
L	H	H	H
H	L	L	H
H	L	H	H
H	H	L	H
H	H	H	L

FOR 74LS30, ANY LEAD IN LO EQUALS HI OUT. ALL LEADS IN HI EQUALS LO OUT.

Figure 3: CTS Truth Table

Figure 4 shows the entire circuit. Notice that the address and data buses are drawn as single lines to prevent cluttering of the drawing, and are labeled on each chip so you can see where they belong. The SRAM chips are labeled as shown by the manufacturer. When wiring the data bus leads, ROM port leads D0 through D7 are wired to SRAM chip leads D1 through D8, respectively.

As we're using two 8K RAM chips to add 16K of memory, we must find a way to access the new memory in 8K blocks. IC3 in Figure 4 does that for us. For memory addresses $C000 to $DFFF (low 8K), it selects IC5. For addresses $E000 to $FEFF (high 8K), it selects IC6. This allows the SRAM to work like any other RAM in the machine. Switch S1 in Figure 4 allows you to select the autoboot feature of the CoCo. When this switch is closed, the computer will automatically execute the program stored in the SRI whenever power is turned on or the computer is reset.

Parts List for Figure 4

C1-C5	0.1 MFD Capacitors
IC1	74LS00 (7400)
IC2	74LS30 (7430)
IC3	74LS138 (74138)
IC4,IC5	2064 Static RAM
R1-R3	1K OHM 1/4W 5%
ROM Port Connector	JE413 (Jameco)
Perfboard	
30 GA. Wire	
Wirewrap Sockets	

Backup Power

You can make this circuit even more versatile by adding a backup power system. The circuit I used is shown in Figure 5. It uses three AA Ni-Cad batteries to maintain the SRAM memory when the CoCo power switch is off. Resistor R4 limits the current the batteries can draw while charging.

Be sure to charge the batteries completely before installing them in the circuit. Under normal conditions, the batteries will maintain memory for two to three days. This should be no problem if you use your CoCo every day. If not, you can install a switch between the batteries and ground to allow you to turn off the batteries if the computer is not being used for long periods of time.

More Bells and Whistles

More experienced circuit builders can add a few more bells and whistles to enhance the SRI. If you connect the Q and CART leads of the CoCo ROM port together, the CoCo will automatically execute any program stored in SRI memory every time the reset button is pushed or the power is turned on. In Figure 6, I've replaced S1 of Figure 4 with a double-pole/double-throw switch and added green and red light-emitting diodes (LEDs) to the circuit. This gives a visual "auto EXEC/norm" indicator. When the switch is set to the AUTOEXEC ON position, the CART and Q leads of the CoCo ROM port are connected together and the red LED will light up. When the switch is set to the AUTOEXEC OFF position, the CART

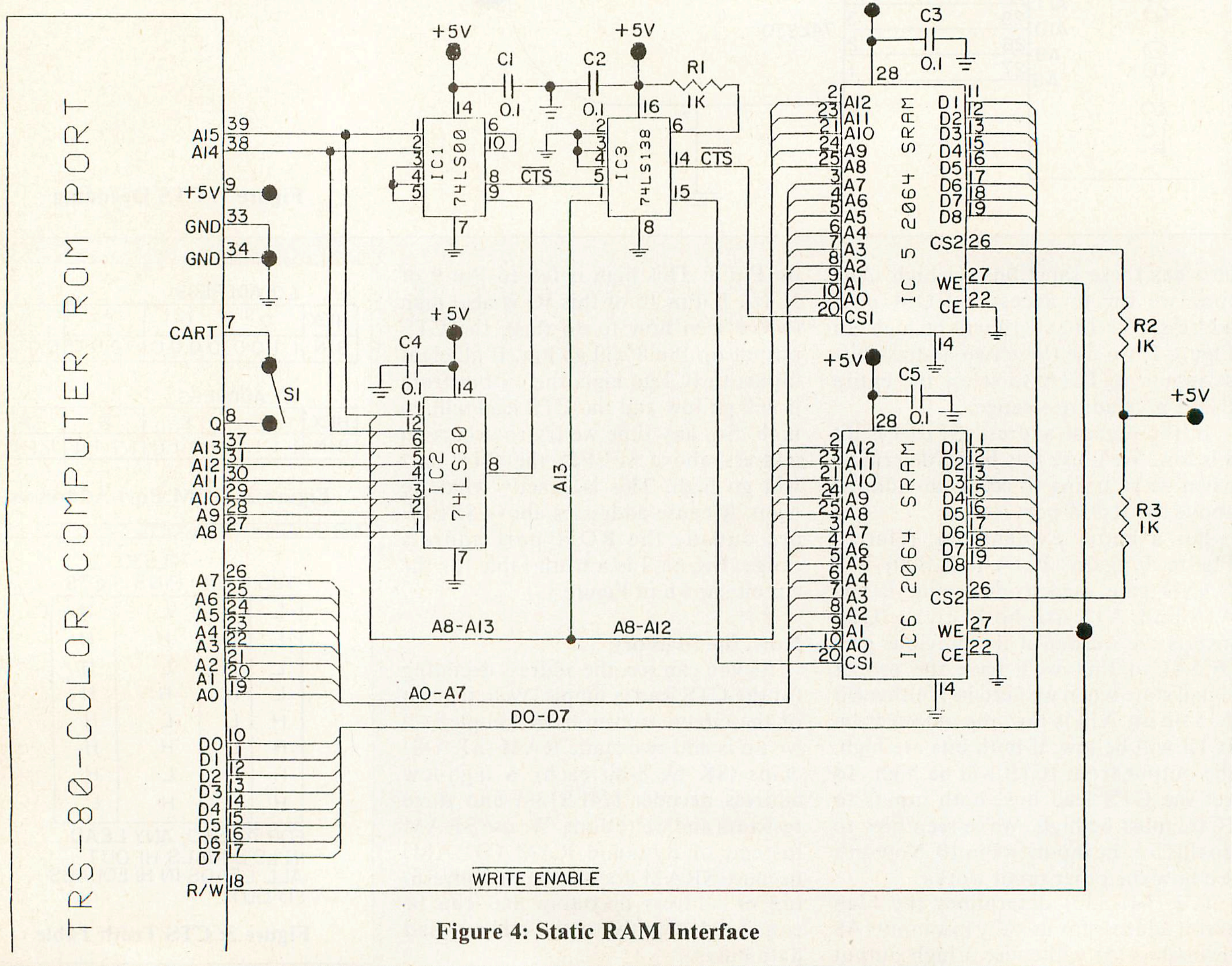

TRS-80-COLOR COMPUTER ROM PORT
A15 39
A14 38
+5V 9
GND 33
GND 34
CART 7
S1
Q 8
A13 37
A12 31
A11 30
A10 29
A9 28
A8 27
A7 26
A6 25
A5 24
A4 23
A3 22
A2 21
A1 20
A0 19
D0 10
D1 11
D2 12
D3 13
D4 14
D5 15
D6 16
D7 17
R/W 18
+5V
C1 0.1
C2 0.1
R1 1K
IC1 74LS00
IC3 74LS138
CTS
C4 0.1
IC2 74LS30
A13
A8-A13
A8-A12
A0-A7
D0-D7
WRITE ENABLE
C3 0.1
IC5 2064 SRAM
C5 0.1
IC6 2064 SRAM
A12 A11 A10 A9 A8 A7 A6 A5 A4 A3 A2 A1 A0 CS1
D1 D2 D3 D4 D5 D6 D7 D8 CS2 WE CE
R2 1K
R3 1K

Figure 4: Static RAM Interface

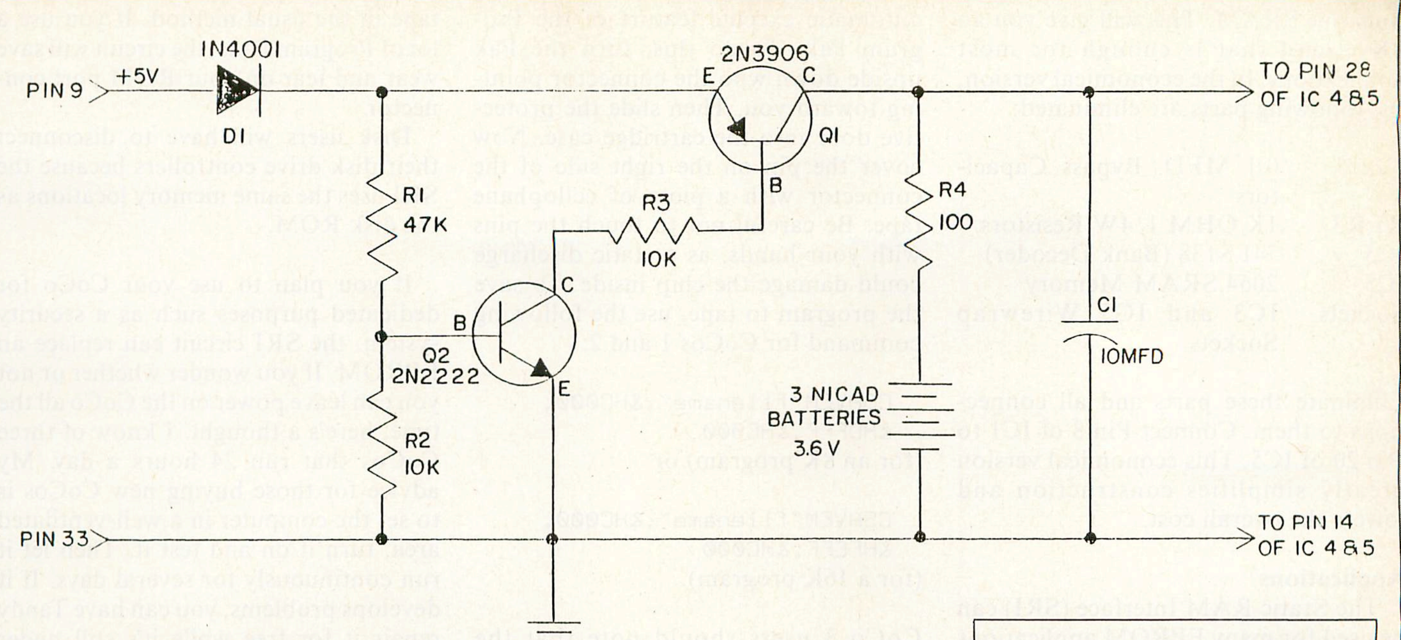

PIN 9
+5V
1N4001
D1
2N3906
E
C
Q1
B
TO PIN 28 OF IC 4&5
R1
47K
R3
10K
R4
100
C
B
Q2
2N2222
E
C1
10MFD
3 NICAD BATTERIES
3.6V
R2
10K
PIN 33
TO PIN 14 OF IC 4&5

Figure 5: Backup Battery Circuit

Parts List for Figure 5

C1	10MFD 10 Volt Elect
D1	1N4001 Diode
Q1	2N3906 PNP TRANS
Q2	2N2222 NPN TRANS
R1	47K OHMS 1/4W 5%
R2,R3	10K OHMS 1/4W 5%
R4	100 OHMS 1/4W 5%
Nicads	3 "AA" Nicad Cells

Parts are available from your local Radio Shack or from Jameco Electronics, 1355 Shoreway Road, Belmont, CA 94002, (415)592-8097

and Q leads are not connected, and the green LED lights up. Note that to automatically execute a program stored in SRI memory on power-up, you must use a backup battery circuit similar to that in Figure 5. Otherwise, you'll be executing garbage and the computer may lock up. This won't hurt the CoCo, though — it's just convenient.

You can add write protection to the circuit by holding the WE (write enable) lead of IC5 and IC6 high. Figure 7 shows how to add a write protect switch and indicator to the write enable lead of Figure 4. The write enable lead must be low to write to IC5 or IC6. When Switch S2 is set to the WR ENABLE position, the R/$\overline{W}$ lead from the CoCo ROM port is connected directly to the write enable leads of IC5 and IC6, and the red LED lights up. When the switch is set to the WR PROT position, the write enable leads of IC5 and IC6 are permanently held high by the 2.2K ohm resistor, and the green LED lights. This prevents accidentally overwriting any program stored in the SRI memory.

Construction

Construction is not critical, but it can be made easy if you wire wrap. I located one SRI board inside the computer beneath the keyboard. If you decide to do this, plan carefully. There's enough room beneath the keyboard on all versions of the CoCo, but the amount of space varies from version to version. I used a Vector board (#JE413) from Jameco Electronics for the cartridge connector. It will be necessary to cut the pin end to fit the ROM port, because the board is a 44-pin card edge connector; the ROM port uses only 40 pins. Keep all leads as short as possible, and be sure to include capacitors C1 through C5 to prevent switching transients from causing problems. Check all wiring visually *and* with a continuity checker before plugging in to the ROM port or applying power to the circuit. Also, note that opening the CoCo case voids any warranty you may have on the computer.

An Economical Version

For those who want to economize, you can build a cheaper version using

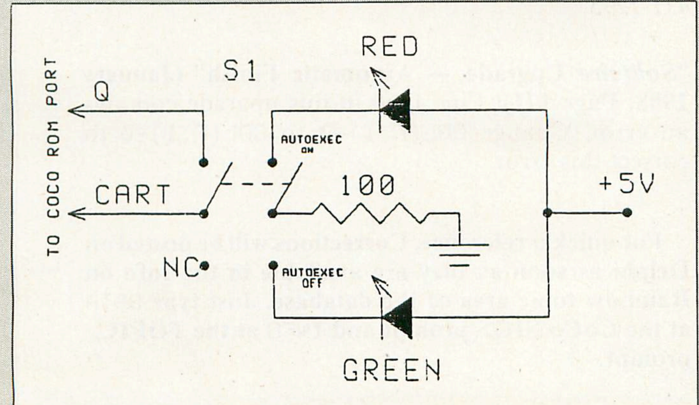

TO COCO ROM PORT
S1
Q
CART
NC
AUTOEXEC ON
AUTOEXEC OFF
RED
GREEN
100
+5V

Figure 6: Auto Execute LED Indicator

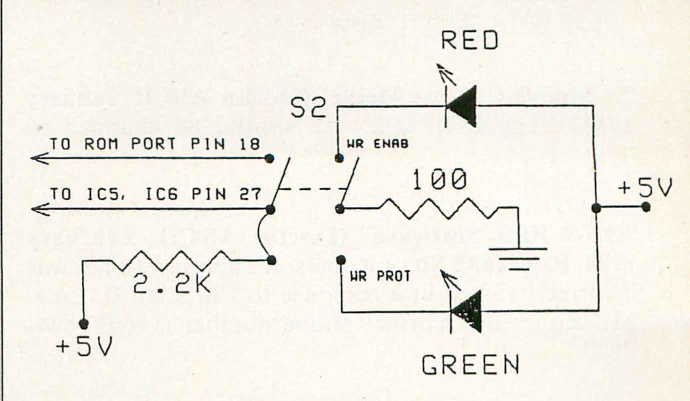

S2
RED
TO ROM PORT PIN 18
TO IC5, IC6 PIN 27
WR ENAB
WR PROT
100
2.2K
+5V
+5V
GREEN

Figure 7: Write Protect LED Indicator

only one SRAM. This will give you an 8K circuit that is enough for most applications. In the economical version, the following parts are eliminated:

C2,C5	0.1 MFD. Bypass Capacitors
R1,R3	1K OHM 1/4W Resistors
IC3	74LS138 (Bank Decoder)
IC5	2064 SRAM Memory
Sockets	IC3 and IC5 Wirewrap Sockets

Eliminate these parts and all connections to them. Connect Pin 8 of IC1 to Pin 20 of IC5. This economical version greatly simplifies construction and lowers the overall cost.

Applications

The Static RAM Interface (SRI) can be used for many EPROM applications in the CoCo 1, 2 and 3. In addition, it can be used to modify programs on Program Paks or other ROMs. I found the SRI so useful that I decided not to build an EPROM programmer after all.

For cassette systems, you can save and load Program Pak programs to and from tape by following these easy steps. First, it's important to disable the automatic execute feature of the Program Pak. To do this, turn the Pak upside down with the connector pointing toward you. Then slide the protective door into the cartridge case. Now cover the pin on the right side of the connector with a piece of cellophane tape. Be careful not to touch the pins with your hands, as a static discharge could damage the chip inside. To save the program to tape, use the following command for CoCos 1 and 2:

```
CSAVEM"filename",&HC000,
&HDFFF,&HC000
```

(for an 8K program) or

```
CSAVEM"filename",&HC000,
&HFEFF,&HC000
```

(for a 16K program).

CoCo 3 users should note that the correct EXEC address for Program Paks in the CoCo 3 is $E010, not $C000.

After you verify the files with the `SKIPF` command, you can execute them from the SRI memory. First, turn off the computer and plug in the SRI memory board. Turn the power on and set switch 1 to the WRITE position. You can now load the programs saved on tape in the usual method. If you use a lot of Program Paks, the circuit will save wear and tear on your ROM port connector.

Disk users will have to disconnect their disk drive controllers because the SRI uses the same memory locations as the disk ROM.

If you plan to use your CoCo for dedicated purposes such as a security system, the SRI circuit can replace an EPROM. If you wonder whether or not you can leave power on the CoCo all the time, here's a thought. I know of three CoCos that run 24 hours a day. My advice for those buying new CoCos is to set the computer in a well-ventilated area, turn it on and test it. Then *let it* run continuously for several days. If it develops problems, you can have Tandy repair it for free while it's still under warranty. Once your new CoCo passes the "soak" test, you'll find it's pretty reliable.

(Questions or comments regarding this project may be directed to the author at 14201 Marquette N.E., Albuquerque, NM 87123. Please enclose an SASE if you are writing for a reply.)

Corrections

"*Address* — Computer Address Book" (Review, March 1988, Page 132): The review of *Address* was incorrectly flagged for the CoCo 1, 2 and 3. Actually, *Address* works only on the CoCo 3.

"Disk *EDTASM* on CoCo 3" (Doctor ASCII, January 1988, Page 154): The listing, `PATCH`, is missing the following line:

```
610 DATA "END","END".
```

"A Simple Cassette Merge" (Doctor ASCII, January 1988, Page 154): `OPEN #1` should be changed to `OPEN"I",#1`.

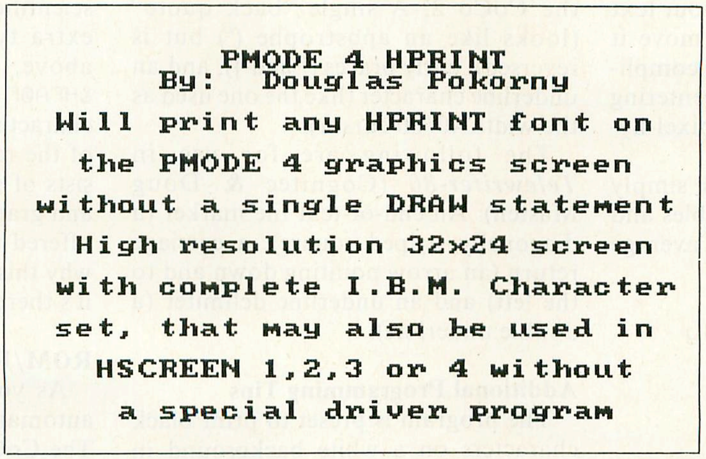
"OS-9 BBS Software" (Doctor ASCII, February 1988, Page 168): Steve Roberson's phone number was incorrectly listed in a response to Christian B. Lutz. Mr. Roberson's correct phone number is (602) 844-7840.

"Poke Monochrome Fix" (Doctor ASCII, January 1988, Page 154): `POKE &HEE066,16` should be changed to `POKE &HE066`.

"Received and Certified" (April 1988, Page 140): The program listed as *Systems* should be *System 5*. Also, the program requires 512K, *not* 128K, as stated. *Elec-Soft, 803d W. 47th Street, Norfolk, VA 23508; 804-451-1255.*

"*Solitaire* Upgrade — Automatic Finish" (January 1988, Page 171): Line 1360 in this upgrade contains an error. Change `COL(F,I)=0` to `COL(F,1)=0` to correct this error.

For quicker reference, Corrections will be posted on Delphi as soon as they are available in the Info on Rainbow topic area of the database. Just type `DATA` at the CoCo SIG> prompt and `INFO` at the TOPIC> prompt.



```
PMODE 4 HPRINT
By:   Douglas Pokorny
Will print any HPRINT font on
the PMODE 4 graphics screen
without a single DRAW statement
High resolution 32x24 screen
with complete I.B.M. Character
set, that may also be used in
HSCREEN 1,2,3 or 4 without
a special driver program
```

Adding the HPRINT Capability to PMODE 4

By Douglas Pokorny

Those of you who have not yet upgraded to a CoCo 3 might feel that your computer is limited in graphics capabilities. Until now, if you wanted to print on the graphics screen, you either had to use a lot of `DRAW` statements, write a machine language program, or buy a CoCo 3.

I can help change that. The program presented here adds the `HPRINT` capability to `PMODE 4` on any CoCo that has 64K or more memory. My `HPRINT` subroutine is 10 lines of BASIC code that call font patterns from high memory. These font patterns, strangely enough, come directly from that little area of memory set aside for the `HPRINT` font. This simply means that any CoCo 3 font you have loaded into memory can be printed on the `PMODE 4` graphics screen. Knowing that most CoCo 1 and 2 owners won't have a lot of CoCo 3 fonts lying around handy to load in, I have included one. It is almost a 100 percent look-alike of the very popular font used by PC clones. The only drawback is that it may be a few data lines too long for the average CoCo user to type in.

Loading the Demo Program

If you are a CoCo 3 user, you simply need to type in the BASIC driver program `FONTDEMO` and run it; you need not type in the `FONTPOKE` program. You may wish to load your own font before running this program, or use the data program to create one for you.

If you are using a CoCo 1 or 2, you have a typing lesson ahead. First type in the program `FONTDEMO` and save it. (If you, for some strange reason, have a CoCo 3 font handy, then skip the next part.) Type in the program `FONTPOKE`, save and run it. This will create an ML file called `IBM.FNT` that is used by `FONTDEMO`. The third program to type is a simple program to transfer ROM to RAM so that you may load in the font `IBM.FNT` without using any of your cramped program memory. When you have those three programs saved and have run `FONTPOKE`, you should have four files on your disk. RAINBOW ON DISK users will need to copy the files to a fresh disk *before* running `FONTPOKE`.

When the cursor reappears, begin by running `ROMRAM`, and then run the program `FONTDEMO`. It in turn will load the file `IBM.FNT` and start printing on the `PMODE 4` graphics screen.

Using the Program

The print program works entirely on an x,y coordinate system, much like the CoCo 3's `LOCATE` command or the `HPRINT (X,Y)` command. It does not feature true wraparound, so be careful when printing so that your text does not exceed the screen width. To make it compatible with the `HPRINT` font, I designed the program to use an 8-by-8 pixel block for each character. This means that there is a screen resolution of 32 columns by 24 lines. The only thing that can possibly be limiting is that the character positions, like the text screen, are fixed. For example, you

---

Douglas Pokorny attends Glenbard South High School in Glen Ellyn, Illinois, where he is a member of the Glenside CoCo Club. He is the co-author of BSE, *a screen editor distributed by Howard Medical Computers.*

cannot specify that you would like this character A exactly 25 pixels over from that box drawn over there. Unless that box just happens to be 25 pixels from a character position, you're out of luck. But not totally. After printing your text you can use `GET` and `PUT` to move it anywhere. Although it's a more complicated procedure, you will find centering text easier than if you use a pixel-by-pixel or `PRINT @` technique.

To use this program you must simply give it the values of three variables and `GOSUB` to the basic code. The average program will look like this:

```
10 X=0: Y=5: A$="I really
like PMODE 4 HPRINT!!"
20 GOSUB 10000
10000 'HPRINT ROUTINE
-Subroutine program-
10010 RETURN
```

In this program, you set the x and y coordinates as `X= x location`, `Y= y location`, and `A$="Text to print"` followed by a `GOSUB 10000`, the location of `FONTDEMO`'s `"HPRINT"` code. Use the same subroutine in your program where you want to print. After printing the message, it will return to where you left off in your program. The parameters are: `X=` 0 to 31 for 32 columns and `Y=` 0 to 23 for 24 rows, and `A$=` any printable text characters from `CHR$(32)` to `CHR$(127)`. This consists of all alphabetic characters, all numbers, punctuation, special characters, and the following not normally producible in Extended Color BASIC on the CoCo 2: A single "back quote" (looks like an apostrophe (') but is reversed), curly braces ({ and }), and an underline character (like the one used as the width 40/80 cursor).

The following are for use in *Telewriter-80* (Cognitec & Doug Masten): An end-of-text file marker (a diagonally striped square), a carriage return (an arrow pointing down and to the left) and an underline delimiter (a double underline).

Additional Programming Tips

The program is preset to print black characters on a white background in `SCREEN 1,1` and black characters on green in `SCREEN 1,0`. This is actually the *inverse* of what would normally be printed. BASIC is set up to print green or white characters on a black background, but I found that black on white or green looks better on my monitor. To change from this inverse mode to normal, simply find the line in the subroutine with the `POKE` command in it. It looks something like this:

```
POKE A+32*D,255-PEEK
(&HF09D+C+D).
```

Change it to:

```
POKE A+32*D,PEEK(&HF09D+C+D).
```

If you own a CoCo 3, there is a scientific character set available with no extra typing. In the line mentioned above, change the `PEEK` location to `&HFA0F` and a new, previously "hidden" character set will be displayed in place of the regular font. The new font consists of scientific, alternative language, and graphics blocks. This feature is not offered to CoCo 2 users. I don't know why this font isn't offered in BASIC, but it's there for your use.

ROM/RAM

As you know, the CoCo 3 does an automatic ROM/RAM on power-up. The CoCo 1 and 2 do not feature this, because this program uses space above `&H7FFF`. CoCo 1 and 2 users must first run the `ROMRAM` utility shown in Listing 3 to put the machine in the 64K mode and allow changes to ROM.

(Questions or comments regarding these programs may be addressed to the author at 932 Oakwood Ct., Glen Ellyn, IL 60137. Please enclose an SASE when requesting a reply.) ☐

Listing 1: `FONTDEMO`

```
10 ' A BASIC ROUTINE TO USE
   HPRINT FONTS IN WIDTH 32
20 LOADM"IBM.FNT"
30 PMODE4,1:SCREEN1,1:PCLS1
40 X=9:Y=0:A$="PMODE 4 HPRINT"
50 GOSUB 10000
60 X=6:Y=1:A$="By:  Douglas Poko
rny"
70 GOSUB 10000
80 X=1:Y=3:A$="Will print any HP
RINT font on"
90 GOSUB 10000
100 X=2:Y=5:A$="the PMODE 4 grap
hics screen"
110 GOSUB 10000
120 X=0:Y=7:A$="without a single
 DRAW statement"
130 GOSUB 10000
140 X=2:Y=9:A$="High resolution
32x24 screen"
150 GOSUB 10000
160 X=1:Y=11:A$="with complete I
.B.M. Character"
170 GOSUB10000
180 X=1:Y=13:A$="set, that may a
lso be used in"
190 GOSUB 10000
200 X=3:Y=15:A$="HSCREEN 1,2,3 o
r 4 without"
210 GOSUB 10000
220 X=4:Y=17:A$="a special drive
r program"
230 GOSUB 10000
240 GOTO 240
10000 IF X<0 OR X>31 OR Y<0 OR Y
>23 THEN PRINT"?FC ERROR":END
10001 A=256*Y+X+3584
10002 FOR B=1 TO LEN(A$)
10003 B$=MID$(A$,B,1)
10004 C=(ASC(B$)-32)*8
10005 FOR D=0 TO 7
10006 POKE A+32*D,255-PEEK(&HF09
D+C+D)
10007 NEXT D
10008 A=A+1
10009 NEXT B
10010 RETURN
```

Listing 2: FONTPOKE

```
10 DATA 0,0,0,0,0,0,0,0
20 DATA 30,78,78,30,30,0,30,0
30 DATA 6C,6C,6C,0,0,0,0,0
40 DATA 6C,6C,FE,6C,FE,6C,6C,0
50 DATA 30,7C,C0,78,C,F8,30,0
60 DATA 0,C6,CC,18,30,66,C6,0
70 DATA 38,6C,38,76,DC,CC,76,0
80 DATA 30,30,60,0,0,0,0,0
90 DATA 18,30,60,60,60,30,18,0
100 DATA 60,30,18,18,18,30,60,0
110 DATA 0,66,3C,FF,3C,66,0,0
120 DATA 0,30,30,FC,30,30,0,0
130 DATA 0,0,0,0,0,30,30,60
140 DATA 0,0,0,FF,0,0,0,0
150 DATA 0,0,0,0,0,30,30,0
160 DATA 6,C,18,30,60,C0,80,0
170 DATA 7C,C6,CE,DE,F6,E6,7C,0
180 DATA 30,70,30,30,30,30,78,0
190 DATA 78,CC,C,38,60,C4,FC,0
200 DATA 78,CC,C,18,C,CC,78,0
210 DATA 1C,3C,6C,CC,FE,C,1E,0
220 DATA FC,C0,F8,C,C,CC,78,0
230 DATA 38,60,C0,F8,CC,CC,78,0
240 DATA FC,CC,C,18,30,30,30,0
250 DATA 78,CC,CC,78,CC,CC,78,0
260 DATA 78,CC,CC,7C,C,18,70,0
270 DATA 0,30,30,0,0,30,30,0
280 DATA 0,30,30,0,0,30,30,60
290 DATA 18,30,60,C0,60,30,18,0
300 DATA 0,0,FE,0,0,FE,0,0
310 DATA 30,18,C,6,C,18,30,0
320 DATA 78,CC,C,18,30,0,30,0
330 DATA 7C,C6,CE,DA,CE,C0,7E,0
340 DATA 30,78,CC,CC,FC,CC,CC,0
350 DATA FC,66,66,7C,66,66,FC,0
360 DATA 3C,66,C0,C0,C0,66,3C,0
370 DATA F8,6C,66,66,66,6C,F8,0
380 DATA FE,62,68,78,68,62,FE,0
390 DATA FE,62,68,78,68,60,F0,0
400 DATA 3C,66,C0,C0,CE,66,3E,0
410 DATA CC,CC,CC,FC,CC,CC,CC,0
420 DATA 78,30,30,30,30,30,78,0
430 DATA 1E,C,C,C,CC,CC,78,0
440 DATA E6,66,6C,78,6C,66,E6,0
450 DATA F0,60,60,60,62,66,FE,0
460 DATA C6,EE,FE,FE,D6,C6,C6,0
470 DATA C6,E6,F6,DE,CE,C6,C6,0
480 DATA 38,6C,C6,C6,C6,6C,38,0
490 DATA FC,66,66,7C,60,60,F0,0
500 DATA 78,CC,CC,CC,CC,DC,78,1C
510 DATA FC,66,66,7C,6C,66,E6,0
520 DATA 78,CC,E0,78,1C,CC,78,0
530 DATA FC,B4,30,30,30,30,78,0
540 DATA CC,CC,CC,CC,CC,CC,78,0
550 DATA CC,CC,CC,CC,CC,78,30,0
560 DATA C6,C6,C6,D6,FE,EE,C6,0
570 DATA C6,C6,6C,38,38,6C,C6,0
580 DATA CC,CC,CC,78,30,30,78,0
590 DATA FE,C6,8C,18,32,66,FE,0
600 DATA 78,60,60,60,60,60,78,0
610 DATA C0,60,30,18,C,6,2,0
620 DATA 78,18,18,18,18,18,78,0
630 DATA 10,38,6C,C6,0,0,0,0
640 DATA 0,0,0,0,0,0,0,FF
650 DATA 30,30,18,0,0,0,0,0
660 DATA 0,0,78,C,7C,CC,76,0
670 DATA E0,60,60,7C,66,66,DC,0
680 DATA 0,0,78,CC,C0,CC,78,0
690 DATA 1C,C,C,7C,CC,CC,76,0
700 DATA 0,0,78,CC,FC,C0,78,0
710 DATA 38,6C,60,F0,60,60,F0,0
720 DATA 0,0,76,CC,CC,7C,C,F8
730 DATA E0,60,6C,76,66,66,E6,0
740 DATA 30,0,70,30,30,30,78,0
750 DATA C,0,C,C,C,CC,CC,78
760 DATA E0,60,66,6C,78,6C,E6,0
770 DATA 70,30,30,30,30,30,78,0
780 DATA 0,0,CC,FE,FE,D6,C6,0
790 DATA 0,0,F8,CC,CC,CC,CC,0
800 DATA 0,0,78,CC,CC,CC,78,0
810 DATA 0,0,FC,66,66,7C,60,F0
820 DATA 0,0,76,CC,CC,7C,C,1E
830 DATA 0,0,DC,76,66,60,F0,0
840 DATA 0,0,7C,C0,78,C,F8,0
850 DATA 10,30,7C,30,30,34,18,0
860 DATA 0,0,CC,CC,CC,CC,76,0
870 DATA 0,0,CC,CC,CC,78,30,0
880 DATA 0,0,C6,D6,FE,FE,6C,0
890 DATA 0,0,C6,6C,38,6C,C6,0
900 DATA 0,0,CC,CC,CC,7C,C,F8
910 DATA 0,0,FC,18,30,60,FC,0
920 DATA C,18,18,30,18,18,C,0
930 DATA 66,33,99,CC,66,33,99,CC
940 DATA 30,18,18,C,18,18,30,0
950 DATA 6,26,66,FE,FE,60,20,0
960 DATA 0,0,0,0,0,7E,7E,0
970 FOR X=&HF09D TO &HF396
980 READ A$
990 A=VAL("&H"+A$)
1000 POKE X,A
1010 NEXT X
1020 SAVEM"IBM.FNT",&HF09D,&HF39
6,0
```

Listing 3: ROMRAM

```
10 'ROMRAM 8/85 RAINBOW
20 CLEAR 999
30 DATA 26,80,190,128,0,183,255,
222,166,128
40 DATA 183,255,223,167,31,140,2
24,0,37,241,57
50 FOR I=1TO21:READA:A$=A$+CHR$(
A):NEXT I
60 P=VARPTR(A$)+1
70 POKE P,126
80 EXEC P
90 PRINT "BASIC IS NOW IN RAM"
```

Just what the Doctor ordered

For All the ROM Reasons

By Marty Goodman
Rainbow Contributing Editor

In this and in future "CoCo Consultations," I will be trying something new. In addition to the familiar Q & A column, I will also include tidbits of information contributed by various folks and, in some cases, comment on the information. Thus, even if you don't have a question, *I invite you to send in any little hints or descriptions of experiences you have had with the CoCo that you think might be of interest to the CoCo-owning public in general.*

I have a disk controller that provides for two different disk ROMs, with a switch to toggle between them. I have a ROM in one socket and none in the other. What would happen if I were to switch to the blank socket while the power is on? What would happen if I had a second disk ROM of some kind in the other socket, and then made the switch?

Andrew James
(ANDREWJAMES)
Nashua, NH

The result would be different in either case depending on whether you have a CoCo 3 or a CoCo 1 or 2. With the CoCo 3, the contents of the disk ROM is moved into RAM and then patched at the instant of power up. After that, the CoCo 3 runs entirely out of RAM memory. It never again looks at the ROM in normal BASIC operation, nor during the operation of many (though not all) commercial programs for the CoCo. Thus, on a CoCo 3, making the switch to another socket should make no difference whatsoever after the first second or so of power up. Note that the ROM is recopied if you do a full cold start (hold down CTRL and ALT keys, press reset, then press reset again). If you switched to a blank socket, then did a full cold start, your computer would come up with Extended Color BASIC, for it would have lost sight of the disk ROM during the cold start/power up process.

On a CoCo 1 or 2, the situation is a bit different. CoCos 1 and 2 normally "run out of ROM" all the time and thus are constantly executing code that resides in the ROM. In particular, there is an "interrupt routine" in Disk BASIC that is executed 60 times a second. If you switch to a blank ROM socket on such a machine, the computer will immediately crash because you have "pulled the rug out from under" its operating code. That is, you will have removed from its "sight" the code it needs to execute 60 times a second.

If you have a different disk ROM in the second socket, things get a bit more complex and subtle. The results depend on three things: the similarity of the two disk ROMs, the physical properties of the switch on the controller, and exactly when you switch it. Two fundamentally similar ROMs, such as Disk BASIC 1.0 and ADOS 2, usually can be switched during normal BASIC operation with no problem. However, about one time in 10, making that switch causes the computer to lock up: This happens if you manage to be turning the switch at the exact time the interrupt code is being executed, when the switch is between positions during the execution of that code. This results in a situation similar to the one above of switching to a blank ROM socket. In general, though, it is a poor idea to switch between disk ROMs while the computer is in BASIC or when it's executing other code. You should always turn the power off (or, on a CoCo 3, do a full cold start as described above) after switching ROMs.

VIP Speller on the CoCo 3

Is there a patch for VIP Speller *to make it work on the CoCo 3?*

Paul McCay
(PAULMCCAY)
Manchester, NH

Because there were many different versions of the *VIP* products released, it is rather difficult for anyone to write a patch that works for all versions. I know of no such patch in the public domain. But S&D Enterprises (P.O. Box 1233, Gresham, OR 97030) is currently selling a CoCo 3 compatible version of *VIP Speller* for $35. For $80 they have listed *VIP Writer III*, a version of *VIP Writer* that utilizes the full 80-column text screen capabilities of the CoCo 3.

Clean Screen

I bought a used Amdek monochrome monitor, the screen of which seemed marred, as if it were scratched. I noticed there was an anti-glare screen up against the picture tube. Despite your warning to me on Delphi about the dangers of messing with this arrangement, I took the monitor apart, and found that the anti-glare screen easily came off the picture tube. The defect turned out to be a buildup of dirt between the anti-glare mesh and the picture tube itself. I washed both the anti-glare mesh and the picture tube using warm, soapy water, rinsed them with water, then put it all back together. The result: My monitor now looks like new, and the blemish is completely gone.

Alex Volpe
(NIGHTAL)
Plymouth Meeting, PA

Thanks much, Alex, for that tip. Amdek 300 series monitors have one of the finest, most glare-free images I've

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Martin H. Goodman, M.D., a physician trained in anesthesiology, is a longtime electronics tinkerer and outspoken commentator — sort of the Howard Cosell of the CoCo world. On Delphi, Marty is the SIGop of RAINBOW's CoCo SIG and database manager of OS-9 Online. His non-computer passions include running, mountaineering and outdoor photography. Marty lives in San Pablo, California.

ever seen. Not everyone has your luck with used monitors, though. Sometimes the problems can be more severe. The anti-glare mesh itself can be *torn*. In such cases, repair is more difficult, though it may be possible to order a replacement anti-glare mesh from Amdek. Note that the Amdek 300 series uses a monochrome composite video input (compatible with CoCo 3), but the Amdek 310 series uses a TTL monochrome input (for use only with IBM monochrome systems).

Vestigial Remains

I noticed that Pin 10 on the CoCo 3's RGB connector is pulled to +5 volts through a 4.7K ohm resistor and also runs to Pin 13 of the 68B21 PIA (Bit 3 of $FF22). What function is this pin supposed to serve? Does shorting that pin to ground cause the CoCo 3 to recognize the presence of the RGB monitor and reset the palette accordingly, or set to 80-column width, or what?

Paul Pollock
(PAULBELL)
Sepulveda, CA

You have discovered a "vestigial" feature on the CoCo 3, which is *not* documented and is *not* officially used. There is *no* code in BASIC, OS-9 or any commercial software I know of that looks for the status of that PIA port bit. My *speculation* is that at one stage of CoCo 3's design, the design team, as you guessed, considered putting a hardware indicator that could be tied to ground to show the presence of an RGB monitor on that 10-pin port.

Fortunately (in my opinion), they abandoned that idea. It would have been a mistake, for many users (like myself) use both monochrome and RGB monitors (or both RGB and composite color video monitors) on their CoCo 3s at the same time. If software were to automatically set up for RGB palette any time it saw a plug in the RGB connector, folks like us might be greatly inconvenienced. It seems, however, that they abandoned the idea *after* the printed circuit board for the CoCo 3 had been laid out, or possibly after it was already in production. So the hardware provision for such a feature remained, despite the decision to abandon software support for this feature.

Note that even Tandy's CM8 does not pull Pin 10 to ground. It simply does not use that line, which is probably the most compelling evidence of all that Tandy itself has decided not to use that provision.

To this day, Pin 10 of the CoCo 3 RGB video connector provides a single-bit input to the PIA port at $FF22, which is normally tied high. Die-hard hackers might find some use or other for that input. For me, the most sensible use for Pin 10 is to disconnect it from its current circuit (by removing R61 and R62, both 4.7K resistors located near the 68B21 PIA) on the board. Then hook either 5 volts or a combined negative sync to that pin to allow the RGB port to be used more flexibly with other brands of RGB analog monitors.

Combined negative sync can easily be generated using a 74LS02 chip you can piggy-back onto the 74LS04 that is currently used as a sync buffer for the separate H and V sync. Putting that on Pin 10 will make it trivial to use the CoCo 3 with Sony and Amiga-type RGB analog monitors, providing there is a proper cable; having +5 volts on Pin 10 means you can put the needed sync combiner and inverter circuitry easily into the cable, allowing even greater flexibility, though causing greater complexity of cable design.

Vertical Resolution

Is there any hardware modification — of any complexity — that allows more vertical lines and/or allows for the use of interlace (as on the Amiga) on the Color Computer 3? Does the upgraded GIME chip support more vertical lines per inch than the old one, even if only in monochrome?

Christopher M. Webster
Shermansdale, PA

The answer to all your questions is one big no. The CoCo was designed around monitors that accept horizontal scan frequencies of 15.75 KHz. This limits it to 200 to 225 lines of vertical resolution. To get more than that would require the use of multiscan monitors, which cost about $1,000 when the CoCo 3 was being designed, and still cost in excess of $500 today. It would have been sheer madness on any designer's part to make a $200 computer that required a $1,000 monitor to get full graphics display! Even if hardware support for such a monitor had been provided, no software developer in his right mind would consider taking the time to write software for it, considering how few CoCo owners would be buying one.

The new GIME chip is basically the same as the old one, with a few very minor bugs corrected. As for interlace, again, no. There is no way to modify the CoCo to use that, short of completely rebuilding and redesigning the computer pretty much from the ground up.

If you want greater vertical resolution, I suggest you look into the Macintosh II or a Sun workstation. You might also consider an 80386 MS-DOS/OS2 machine with VGA adapter. Any of these systems will set you back $5,000 to $20,000, depending on configuration. The Amiga, which uses interlace in its highest vertical resolution mode, suffers from flicker problems. Indeed, most color graphics programs for it wisely elect to use no more than 200 to 225 lines of vertical resolution, turning off the interlace feature to avoid this problem.

BASIC Enhancements

Can the CoCo 3 be made to power up to a 40-column screen?

John N. Lim, Jr.
(NAHALEA)
Mililani, HI

See pg 149

Yes. By using ADOS-3, you can configure and burn an alternate DOS EPROM that will cause the CoCo 3 to power up in 40 or 80 columns in any color set you choose. ADOS-3 also enhances BASIC in many other ways, including adding a full-screen editor and fixing BASIC for proper disk operation at double speed. I highly recommend it. It is available from SpectroSystems. When you buy the product you get a *software* product, which, for an additional fee, you may send out to have burned into an EPROM.

Your technical questions are welcomed. Please address them to CoCo Consultations, THE RAINBOW, P.O. Box 385, Prospect, KY 40059.

We reserve the right to publish only questions of general interest and to edit for brevity and clarity. Due to the large volume of mail we receive, we are unable to answer letters individually.

Questions can also be sent to Marty through the Delphi CoCo SIG. From the CoCo SIG> prompt, pick Rainbow Magazine Services, then, at the RAINBOW> prompt, type ASK (for Ask the Experts) to arrive at the EXPERTS> prompt, where you can select the "CoCo Consultations" online form which has complete instructions.

What's in a file?

Files and Protocols

By Cray Augsburg
Rainbow Technical Editor

Last month we took a brief excursion into terminal software choices. We also hit lightly on how the CoCo SIG database areas are organized. Finally, we took a look at the various filename extensions used in the databases. So, we're all set to download! Or are we?

Files

Before we actually go into the SIG and begin downloading, we should take a moment to learn a little about files. Just what is a file? A file is a collection of related characters, or bytes, that are combined to form some meaning. A particular file might be a program. It could also be an article (text file) or even data for a program. Each byte in a file can take on a value from 0 to 255, inclusive. This is because the eight bits that form a byte can be used to form 256 different combinations.

In days past, only seven of the eight bits in each byte were used to form a character. Seven bits can form 128 different combinations. You may be familiar with the term ASCII, which stands for American Standard Code for Information Interchange; this is a code that uses only seven bits from each byte. For our purposes, the eighth bit is meaningless. This means that in an ASCII file, each byte takes on a value from 0 to 127 inclusive. Each byte can be used to represent one of 128 different characters. The ASCII code allows the use of all upper- and lowercase alphabetic characters, the numbers 0 through 9, punctuation and some common "control characters" such as carriage return and line feed.

A text file generated with a word processor is a current example of an ASCII file. Most word processing programs store files in ASCII format or at least have the ability to do so. BASIC programs can be saved in ASCII format on the CoCo, as well. We simply follow the filename with `,A` when saving. If this isn't done, the file will be saved in what is called binary format.

A binary file is one in which all eight bits are used in each byte. This allows the file to contain control codes and graphics information. It also allows the storage of machine language information, since values used in machine language range from 0 to 255.

Some use the terms "compressed" or "tokenized" when referring to BASIC programs saved in binary format. This is because, unless you use the ASCII option (`,A`), the BASIC keywords (e.g. `PRINT`, `INPUT`, `GOSUB`, etc.) are not stored as a collection of characters forming that keyword. Instead, BASIC converts each group of characters forming a keyword into a binary value called a token. Each token is a one-byte value. So, the keyword `PRINT` takes up only one byte instead of five when it is stored. The resultant savings is most obvious on larger BASIC programs stored on disk. Try saving a long BASIC program to disk in ASCII format. Then save it in tokenized format. Compare the amount of disk space used to store each save.

Now that we have an idea about the differences between ASCII and binary, how is that information useful to us? This little bit of information often dictates what methods we use to download a file. One of the main reasons for standardizing filename extensions in the databases was to allow users to have information regarding the filetype before initiating a download. It is also very important when it is time to save that downloaded file.

Protocols

Several methods are available to us for downloading files from online information services. The two basic categories are non-error-checking and error-

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Cray Augsburg is RAINBOW's technical editor and has an associate's degree in electrical engineering. He lives in Louisville, Kentucky. His username on Delphi is CRAY.

Database Report

By Don Hutchison
Rainbow CoCo SIG Database Manager

First off, let me remind you that RAINBOW ON TAPE and RAINBOW ON DISK programs are available online on the Rainbow CoCo SIG and OS-9 Online. These are the same programs and files that are published monthly in the pages of THE RAINBOW.

We publish the programs online each month at about the same time that you receive your copy of THE RAINBOW, so you won't have to wait to download the ones you want. The ordinary BASIC programs are available in the database of the CoCo SIG, while the OS-9 files are available in the database of OS-9 Online. Just type `DATA RAINBOW` in either SIG to get to these files. Now let's look at the new uploads for this month!

OS-9 Online

In the General topic of the database, **Christopher Burke** (COCOXT) uploaded Burke & Burke Application Note #3. **Denny Skala** (DENNYSKALA) posted a review of *Stylograph*. **Jim Johnson** (REINDEER) provided a very popular file containing a detailed description of how to build an OS-9 Level II system disk that boots up into an 80-column device window and also creates a VDG screen for use with Level I programs. (Jim also provided a hint in the file on how to run *Koronis Rift* on a VDG screen other than `/TERM`.)

In the Programmers Den topic of the database, **Bruce Terry** (THEMAGE) uploaded his *Hordes and Holes* game. In the Applications topic of the database, **Dick White** (DICKWHITE) uploaded the Federal Income Tax form 1040 as a *DynaCalc* spreadsheet for the tax year 1987. (This spreadsheet should also be usable under the RS-DOS version of *DynaCalc*.) **Alan** checking. Common examples would be the buffer capture method and Xmodem, respectively. Since these are the most common methods used with the Color Computer, they will be the only methods discussed here.

Without going into great detail, suffice it to say you should use the buffer capture method only when dealing with an ASCII file, be it a BASIC program or a text file. During buffer capture each byte is sent as a totally separate entity. The received byte is stored in your computer's memory without regard to its value. And, because of problems with noise on the phone lines, there is no guarantee that the byte sent from the host is the same as that received by your computer. A file downloaded with this method may contain several incorrect characters. Editing an ASCII text file downloaded via this method is painful enough; trying to edit a machine language file under these conditions is impossible. For this reason, if you want to download a file that has been stored in binary format, use an error-checking protocol such as Xmodem.

In an Xmodem download, the information in the file is grouped into blocks of 128 bytes each. Actually, the size of the block is larger than that, but the file content in the block is 128 bytes. The other bytes in the block are used to check that block for errors. If no error is encountered in a given Xmodem block, the sending computer is notified; it will move on and send the next block. However, if an error is found, the receiving computer will ask the sending computer to send the same block again. This is known as a "retry." Generally, the two computers will allow up to 10 retries. After that, the download is aborted. This process continues until either the file is transferred or the process is aborted. The advantage of using Xmodem is that it can be used to download any type of file reliably. This is why you are urged to purchase a terminal program that supports this, if not some other type of error-checking file transfer protocol.

Moving On . . .

As I indicated last month, the CoCo SIG database is divided into 16 different topic areas, 14 of which are user-accessible. These topic areas are as follows:

General Information
CoCo 3 Graphics
Source for 6809 Assemblers
Utilities & Applications
Hardware Hacking
Games
Classic Graphics
Music & Sound
Info on Rainbow
Archives
HELP
Product Reviews & Announcements
Rainbow On Tape
Data Communications

For our purposes, it may be easier to view the database as 14 different databases. Another visualization aid is the file cabinet. Imagine the database as a 14-drawer file cabinet and each drawer as being one of the 14 database topic areas. When you type `DAT` at the CoCo SIG prompt, you are asked for a topic. Delphi is just asking which drawer you want to look through. Pick one and Delphi will put you there — *it will* open that drawer for you. In picking a topic area, you need enter just the first three characters of that area to make your entry unique. Just as with other prompts on Delphi, abbreviations work fine here.

When the drawer is first opened, you will find yourself at the "top" of the chosen database. For instance, if you choose the Music & Sound topic at the `TOPIC>?` prompt, you will see the `DBASES:Mus>` prompt appear on the screen. You are now ready to look through the file drawer and see what's there. For instructions on this, I refer you to last month's Delphi Bureau.

Because of its design, the file cabinet is somewhat precariously balanced. You can have only one drawer open at any one point in time. Otherwise, the file cabinet would fall over. In other words, you can't be in two different topic areas at the same time. Not to worry, though. Delphi will take care of this for you. And you can switch drawers quite easily. This is done with the `SET` command. The `SET` command can be en-

Sheltra (PHDRAGON) provided `CCDEX.B09`, a Rolodex-type program for names and addresses. **Pat Abramovitch** (HUBBS) posted the source code for his `CHECK09` program.

In the Utilities topic of the database, **Pete Lyall** (OS9UGVP) provided `MORE.AR`, a `MORE`-like program similar to that provided under UNIX. Bruce Terry uploaded `LISTER.AR`, a text file listing utility with pagination and header options.

In the Device Drivers topic of the database, **Karl McMurdo** (XRX23) posted `PPRINT.AR`, which contains a driver and device descriptor for the parallel port described in the November and December '87 issues of THE RAINBOW. **Alan Parker** (ALPARKER) uploaded a printer driver to be used with the Star SG10 printer and Tandy's *Home Publisher*.

In the Patches topic of the database, **Dave Philipsen** (DPHILIPSEN) posted `COPYPATCH.AR`, an `IPatch` file, and documentation to patch the OS-9 Level II `Copy` command to overwrite existing files. If an existing file has been selected as the destination file, the patched `Copy` command will ask if it should be overwritten. **Jason Forbes** (COCO3KID) uploaded `GAMEPATCHES.AR`, an `Ipatch` file that contains a series of patches that will fix *Koronis Rift* and *Rescue on Fractalus*. **Dave Archer** (DAVEARCHER) provided `FIXRX`, a patch that allows the Epson printer driver (`prn.EpsonRX`) to be used with a Gemini 10X printer. **Ken Scales** (KSCALES) uploaded `KEYTAB03`, a set of patches to `CC3IO` to provide alternate mapping for the non-alpha key codes, allowing the arrow and function keys to be used more easily under *DynaStar*. The two key maps may be toggled independently on a per-window basis.

In the Telecommunications topic of the database, **Bill Brady** (OS9UGED) uploaded `XMac`, an Xmodem fileserver. `XMac` is the missing ingredient that you need to make OS-9 a BBS in its own right. `XMac` allows a user logged on to your system to transfer files in the Xmodem protocol. Bill also provided `WIXMOD.I`, a replacement Xmodem module for *The Wiz*. This new version is much faster than the original, and fixes two problems. **Merle Kemmerly III** (TOOK3) provided C functions that allow you to transmit files via Xmodem protocol. **Warren Hrach** (WAROCK) posted `DYNALOG`, a BASIC09 procedure for converting *Wiz* autolog files to *DynaCalc* files.

In the Graphics & Music topic of the database, **Rick Adams** (RICKADAMS) uploaded three of his favorite shell scripts for setting up one, two or three windows in OS-9 Level II. They create the windows, initiate the fonts, set up the proper color sets, head up each window with a neat-looking label, and then start the shells. **Michael Washburn** (COMPZAP) posted a modpatch file for using *Home Publisher* with Gemini 10x printers. **Jimmy Lemke** (JIMLEM50) uploaded a *Star Trek* game. **Brian Stretch** (BRIANSTRETCH) posted `SHELICON.AR`, a nice, simple 80-by-24 icon to replace the "cute" window created by `Gshell` under *Multi-Vue*. Dave Archer uploaded `MAC`, an `ARC`ed file containing a scrolling Macintosh picture viewer, a Gemini 10X printer dump for the picture, and associated documentation.

CoCo SIG

In the General topic of the database, **Mike Andrews** (MANDREWS) provided a very interesting and detailed listing of tered at either the `DBASES>` prompt (top of the database) or the `ACTION>` prompt (discussed last month). Just enter `SET`, followed by the first three characters of the new topic area. For instance, we are now in the Music & Sound database. To change drawers and go to the CoCo 3 Graphics database, enter `SET COC` and you're there!

To complete the file cabinet scenario, let's take a look at groups. The CoCo SIG is the filing cabinet, and the drawers are the individual databases or topic areas. Each folder in a given drawer represents a group. On Delphi, a group is a collection of one or more files. Note that a group might have just one file in it. When you type `DIR` (or just press ENTER) at the `DBASES>` prompt, the directory you see is actually a list of the group names, or folders, within that database, or drawer.

Before you can download from a group, you must open that group by reading it. This is done by typing `READ`, followed by the name of the group as it appeared in the directory. Again, abbreviations work here. The only rule is that you must enter enough characters to make your entry unique so Delphi knows exactly which group you want to look at.

> ***"A binary file is one in which all eight bits are used in each byte. This allows the file to contain control codes and graphics information."***

When you have opened the group by reading it, you will then see a brief description of the group along with the name(s) of any file(s) it contains. To continue with the filing cabinet metaphor, liken each file to a piece of paper within the chosen folder.

Short of actual downloading procedures, you are armed with enough information to really get going. I urge you to log on and take a look around the databases. See what's there. If you are adventurous, try downloading. Experience is the best *teacher. If* you really get things fouled up, just turn your modem off, get back online and try again. For those who are more faint of heart, we'll take a look at actual downloading next month. □

"smilies," the text/art "faces" that are so popular in Mail and Conference. I (DONHUTCHISON) provided a humorous file called "Tenne-C," which is a mock product announcement for a new C compiler.

In the CoCo 3 Graphics topic area, **Donald Ricketts** (STEVEPDX) was this month's most active uploader, providing us with over 130 digitized images and conversions! Most of these are digitized images that have been converted to *CoCo Max III* format. Thanks, Donald! **Richard Trasborg** (TRAS) sent us LCG.MGE, a graphics advertisement (drawn by Mike Trammell) for a Staten Island BBS that specializes in graphics. In response to a SIG member's request, Richard also uploaded a *CoCo Max III* picture of Loni Anderson converted from a Macintosh picture, and several other *CoCo Max III* pictures that he converted from DS-69 digitized images. **Ken Schunk** (KENSCHUNK) uploaded a *QuickBASIC* program for IBM compatibles that lets them display digitized DS-69 pictures from the CoCo SIG. **Orman Beckles** (ORMAN) uploaded his *FireStorm* program for simultaneously generating interesting graphic displays and relaxing music. **Roger Bouchard** (HARBIE) uploaded a very popular utility for converting 256-by-256 digitized images into HSCREEN2 pictures. Roger also uploaded an MGE demo program he wrote for his local Radio Shack store. The program will continuously display all of the MGE pictures on a disk to demonstrate the graphics abilities of the CoCo 3.

In the Source topic of the database, **Mike Ward** (MIKEWARD) provided the source code for his MUSORC program, which he posted in the Music topic of the database. The full program allows one to play *Musica* files in stereo through the *Orchestra-90* pack.

In the Utilities & Applications topic of the database, Brian Stretch provided parallel port printer drivers for use with the JFD-CP disk controller. Brian provided a version for CoCos 1 and 2 and a separate version for the CoCo 3. **Bob Montowski** (GRAPHICSPUB) uploaded an Ipatch file to allow the use of a Gemini printer with *Home Publisher.* **Rodger Alexander** (SALZARD) uploaded an ARCed file called STAREDIT, which contains a utility for editing downloadable character sets for the line of Star printers. Orman Beckles provided his *Palette Master* program, while **Hadley Hazen** (HAZE) uploaded Version 2 of his disk label-maker program.

In the Hardware Hacking topic of the database, **Marty Goodman** (MARTYGOODMAN) uploaded a valuable text file chockfull of analog RGB video information.

In the Games topic of the database, **John Barrett** (JBARRETT) uploaded four games: *Moon Miner, Seeker, Star Ways* and *Interstellar Kamikaze.* **Nathan Camp** (NATHANCAMP) uploaded his help program for dungeon masters, and **David Yale** (DAVEYALE) uploaded the "DM Friend" program that he wrote three years ago. **Blair Hogg** (BLAIRH) provided information on moving *Flight Simulator* to other types of disks. **Paul Dion** (PAULNORMAND) provided two games written in BASIC called *Gorfland* and *Dfishing.*

In the Classic Graphics topic of the database, **David Mills** (DAVIDMILLS) uploaded a great demonstration program of his space shuttle and database package. Orman Beckles uploaded some famous faces from science fiction pictures, and several pictures of Barry Silverman in various formats.

In the Music & Sound topic of the database, **Mike Ward** (MIKEWARD) uploaded his popular MUSORC utility program in response to several questions in the CoCo SIG Forum. This utility will allow you to play your *Musica* files through the *Orchestra-90* pack in stereo. It uses the all-RAM, high-speed mode to improve the music quality. You may interrupt any tune in mid-play by pressing BREAK. It also provides for playing all of the tunes on the current disk. Orman Beckles uploaded several music files, including lost music from *Star Trek, Color Midi II* music, the "Post Frowien Blues," and several *Colorchestra* files. Orman also posted *The Creator*, a utility to change your *Musica II* files into stand-alone binary files.

In the Archives topic of the database, Dick White posted eight more archived polls.

In the Product Reviews & Announcements topic of the database, Christopher Burke provided a product announcement about Version 2.0 of *Hyper I/O.* Steve Ricketts provided a text file of his experiences with *Word Power 3*, and **Jim Goettig** (JGMG) uploaded a revision to his original review of *Word Power 3.* **Jim Reed** (JIMREED) posted a text file that gives a quick peek at the features of the new *Telewriter-128* from Cognitec.

In the Data Communications topic of the database, Mike Ward provided a modification for Version 4.7 of his popular terminal program *MikeyTerm* that forces it to wait for an acknowledgment from the host after an Xmodem upload has completed. If you are having trouble with aborted uploads after they appear to have completed OK, or you want to rid yourself of that "Second EOT missing" message on Delphi after an Xmodem upload, you might want to try this modification.

As you can see, we had a very active and interesting month on the Rainbow SIGs! Hope to see all of you online on Delphi!

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Formatting Text With *Telewriter*

By Jose L. Jimenez

Our family was divided between *Color Scripsit* and *Telewriter-64*. My son used to think *Scripsit* was the greatest until he saw the quality of work possible with *Telewriter-64*. I changed his loyalty by providing him with a very simple means of accessing some of the more complex features of *Telewriter-64*, such as using different type fonts on the same page and making lines, charts and even extra-large characters and graphics.

In this article I will show you how you can easily use *Telewriter-64* to format your text.

Different Type Fonts

Most modern printers have a variety of fonts that can be accessed by sending the appropriate control codes to the printer. With *Telewriter-64* you can make dynamic changes of fonts within the text — not all word processors can do this. The following examples access the fonts most common on the Tandy series of printers, except for the DMP-100:

```
CONDENSED
NORMAL
CONDENSED+ELONGATED
NORMAL+ELONGATED
```

Using *TW64*, type the following listing and save it as `PRINTDRI/TWR:0` on the same disk as your *TW64* backup:

```
^T 05 15 20 25 30 35 40 45
 50 60 [TABS]
^D1 014
^D2 015
^D3 18
^D4 27 14
^D5 27 15
^D6 27 19
^D7 27 20
^D8 30
^D9 94
^T =================
^S1 M0 C72 U2 L66 B5
^T =================
```

(This provides printer control code definitions.) You can also add the printer control codes shown in Figure 1. If you need more memory, the chart can be deleted by using CLEAR-E at the end of the chart and CLEAR-X at the beginning of the chart.

Jose L. Jimenez owns his own business and lives in San Jose, Costa Rica. He and his family enjoy programming on the CoCo and put it to use in the business.

Notice (in Figure 2 and the listing) we have used an up arrow (^) character before the instruction. To generate the up arrow, use CLEAR-.. The ^ is an *instruction* sent to the printer. After the ^ we must define whether the instruction is functional, change of character size, condensed, normal, etc., or if it is a special character that is not found on the keyboard. If we follow the ^ with

Figure 1: Printer Control Codes

Function	Control Code
Bold start	27 31
Bold end (new)	27 32
Bold end (old)	27 30
Elongated/pitch start (new)	27 14
Elongated end (new)	27 15
Elongated (old)	31
Elongated (new)	32
Type, proportional, select	27 17
Type, 10 pitch, correspondence, select	27 18
Type, 10 pitch, standard, select	27 19
Type, 12 pitch, correspondence, select	27 29
Type, 12 pitch, standard, select	27 23
Type, condensed, select (new)	27 20
Type, condensed, select (old)	27 14
Type, condensed, cancel (old)	27 15
Type, italics	27 66
Type, microfont	27 77

DP, it is a *printable instruction.* If we follow the ^ with D, this is a *control instruction to the printer* such as condensed, normal, etc.

Accessing Printer Character Fonts

In order to access any font your printer has, place the file PRINTDRI/TWR at the beginning of your new file. All you need to do is press CLEAR-#. The # is any number from 1 through 9. Zero is reserved for a 51-column display mode and cannot be used for printer control codes. For instance, if you want a word to be condensed, press CLEAR-7 (press CLEAR and 7 simultaneously). Notice that a small number 7 appears on the screen. Do not forget to place CLEAR-6 at the end of the word, phrase or paragraph to come back to normal characters. Access to other fonts is described in Figure 2.

If your printer has more font sets than are covered here (such as bold, italics, microfont, etc.), you can redefine any of the nine controls on the table of Control Code Definitions at the beginning of PRINTDRI/TWR and establish your own. By using the proper CLEAR-# you will obtain the results you need for other print controls. See Figure 1.

If you run out of control codes 0 through 9 (it happens to me quite often), you can redefine controls at any time within the text. The printer goes by the last definition you made.

It is a good habit to end all files on normal operation of your printer to avoid having to turn it off to reset normal operation — quite an inconvenience for the next user.

Additional Printer Control Codes

The printer controls in Figure 1 were taken from *How to Use Your Radio Shack Printer*, Page 56, by William Barden, Jr., published by Tandy. Check your printer manual to establish which one you can use.

Setting Up a Permanent Printer Format

By typing in and saving PRINTDRI/TWR on the same disk with your *Telewriter-64* backup, you are able to make a simple format of your next file. Simply read in PRINTDRI/TWR:0 and proceed to type your new file. For existing files, you can read in PRINTDRI/TWR and append your existing file.

Characters Per Line

Each font requires different spaces to be printed, and it is difficult to guess or count the number of characters that fit in one line. The graphic rulers in Figure

Figure 2: Reference Chart of Printer Format Codes

Format Instruction		Printer Control Code	
^S	Single line	^1	Ends underline
^M	Left margin	^2	Begins underline
^C	Characters per line	^3	Select graphics mode
^U	Upper margin	^4	Begins elongated
^L	Lines per page	^5	Ends elongated
^B	Bottom margin	^6	Select normal characters
		^7	Condensed characters
^T	1st line tabulator	^8	Ends graphics mode
	Doesn't print line	^9	Up arrow

SPECIAL CHARACTERS:

^	CLEAR period	[	SHIFT up arrow
\	CLEAR comma	]	SHIFT CLEAR

Printer Control		CLEAR+number or letter	
^47	Long condensed 56	^N	Skip page
^46	Normal long --56	^Q	FILE/EXT:0 next file
^7	Condensed ----6	^;]	Do not justify

Figure 3

S	=Line spacing	1	=Single Space 2= Double Space	[1]
M	=Left margin	0	=Zero spaces on the left side	[2]
C	=Characters per line	80	=80 characters limited by printer	[3]
U	=Upper margin	0	=Zero lines empty on top of page	[4]
L	=Lines per page	66	=66 full line feeds per page	[5]
B	=Bottom margin	0	=Zero lines empty on the bottom	[6]

[1] values of 0 to 255 maximum.

[2] 0 to 255 maximum. Left margin plus characters per line cannot exceed the capacity of the printer (usually 80- or 132-column) on the size of character you are using. You can print in multiple columns by changing the left margin and making multiple passes. A good combination of format control for two columns with condensed (132-column) characters is ^M5 C57 M5 for the first column and ^M70 C57 for the second. Place the second instruction on the page break and use the One Page control on the Format menu.

[3] 0 to 127 maximum. Right margin is determined by the capacity of the printer minus the left margin minus the characters per line.

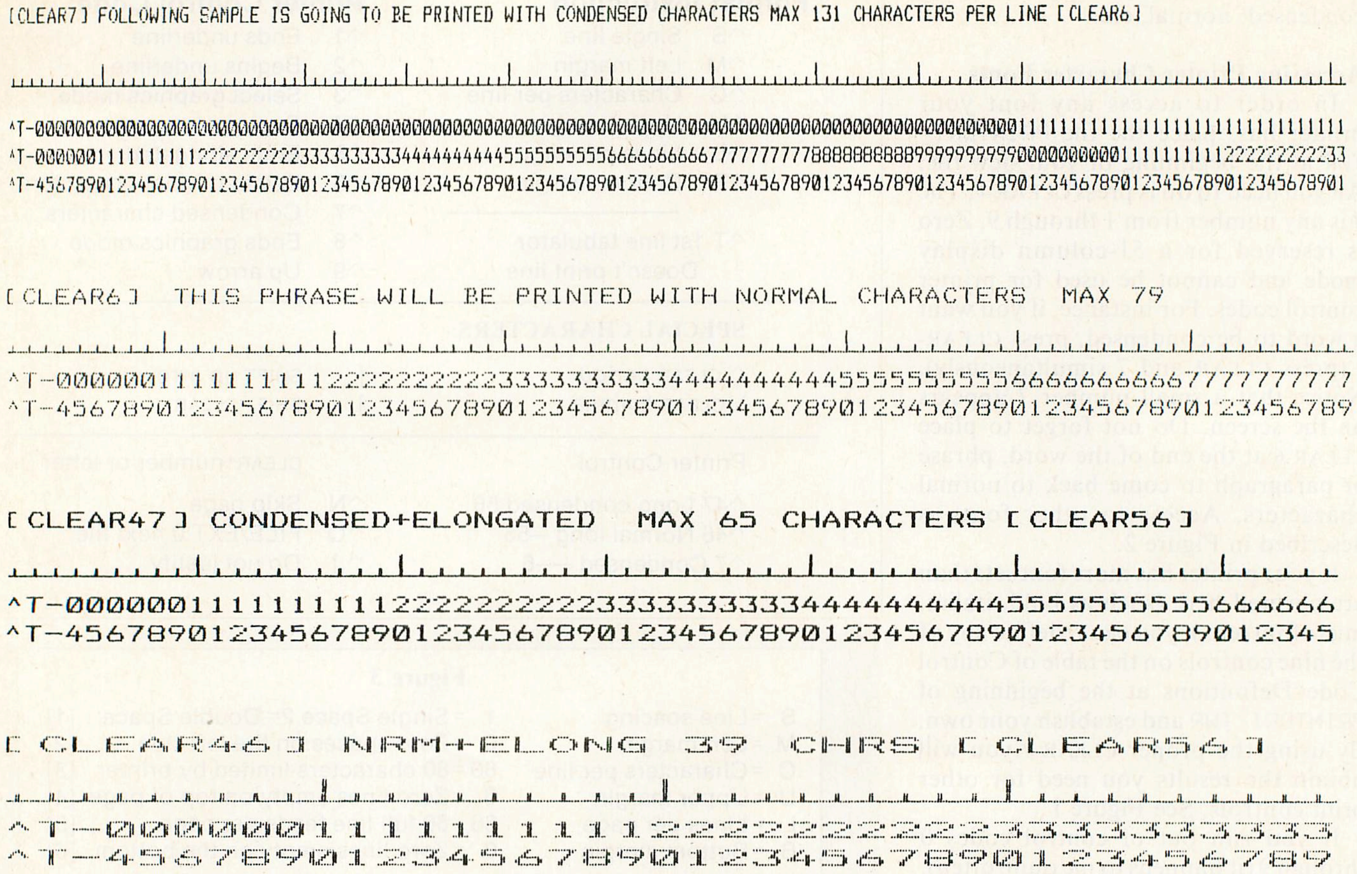
[4] Default is 4.

[5] Normally, a printer defaults to full line feed, but you can also alter this condition either under program control or sending control to the printer. Early Radio Shack printers could only move the paper forward (such as the DMP-120). Newer printers can move backward to print accents and do graphics work. Half-forward and half-backward are used in conjunction with superscript and subscript. See the chart below for different types of line feed.

[6] Default is 4, but must be at least 3 to print page numbers on the bottom.

Type of Line Feed	Line Feeds Per Page	Movement	Control Code
Full Forward Line feeds	66	0.166 inches	27 54
3/4 Forward Line feeds	88	0.125 inches	27 56
1/2 Forward Line feeds	132	0.833 inches	27 28
1/12 Forward Line feeds	550	0.020 inches	27 50
Full Backwards Line	66	0.166 inches	27 10
1/12 Backwards Line	550	0.020 inches	27 30

Figure 4: Graphic Rulers



```
[CLEAR7] FOLLOWING SAMPLE IS GOING TO BE PRINTED WITH CONDENSED CHARACTERS MAX 131 CHARACTERS PER LINE [CLEAR6]

^T-000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000011111111111111111111111111111111
^T-00000011111111112222222222333333333344444444445555555555666666666677777777778888888888999999999900000000001111111111222222222233
^T-45678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901

[CLEAR6]  THIS PHRASE WILL BE PRINTED WITH NORMAL CHARACTERS  MAX 79

^T-0000001111111111222222222233333333334444444444555555555566666666667777777777
^T-4567890123456789012345678901234567890123456789012345678901234567890123456789

[CLEAR47] CONDENSED+ELONGATED  MAX 65 CHARACTERS [CLEAR56]

^T-000000111111111122222222223333333333444444444455555555556666666
^T-456789012345678901234567890123456789012345678901234567890123456

[CLEAR46] NRM+ELONG 39 CHRS [CLEAR56]

^T-0000001111111111222222222233333333333
^T-4567890123456789012345678901234567890123456789
```

4 aid in determining if a line is going to fit into the space of an 80-column printer. The numbers of the graphic rulers indicate the maximum number of characters per line. Type in the rulers in Figure 4 and save the file as `RULER/TWR`. It can be appended to your file any time you want to determine the length of line of special fonts. If you include the `^T` at the beginning of the line, the ruler will not be printed.

Printer Format Instruction

The permanent format for your file is controlled by the following instruction included in the `PRINTDRI/TWR` file:

```
^S1 M0 C80 U0 L132 B0 ***
```

The letters of the instructions have control over the format of the form. The functions of the letters are shown in Figure 3.

You can make any of these changes you want in the permanent format on the control line, such as adding double spacing by changing S1 to S2, or changing the number of characters per line from C80 to C75. By storing the printing format information with your file, any time you want to print your file, all you have to do is go to the disk input/output menu Disk I/O, read your file and then go to the Format menu and print. The printer control instruction *must be on its own line* any place in the file. You can change the format parameter within the file any time you want. The printer will go by the last instruction received.

(Questions or comments about this tutorial may be directed to the author at P.O. Box 3830, Room 4301, San Jose, Costa Rica.)

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Using LEDs to see which slot on your Multi-Pak is active

Multi-Pak LED Update

By Tony DiStefano
Rainbow Contributing Editor

Back in February '85, I wrote an article describing how the Tandy Multi-Pak worked. I followed that up with a project involving a little circuit that could decode the latched bits and drive some LED digits to tell you which slot was active. Since there were two active areas of memory available in the Multi-Pak, you needed two LED digits and two driver chips. It worked well for a time but, as always, Tandy likes to throw some curves — they changed the insides of the Multi-Pak.

In order to make the Multi-Pak less expensive to make, and therefore less expensive to buy, they took many of the chips, grouped them together and made one big custom clip. This was great for them, as the price for the Multi-Pak went down and they sold more of them. Good for them, but not so good for my circuit — it no longer worked. Those latched bits I used to get the data to drive the LEDs are no longer there.

When this new Multi-Pak came out in '86, I got a few letters asking if there was anything I could do. At the time I thought it would be too much trouble to redesign the circuit, too many chips and too much work for it to be worthwhile to build. But lately I've had some calls about this one again. So here goes another big project.

Reviewing the Multi-Pak

Let's recap what was said in that article. The first half of the article described the functions of the Multi-Pak and the second half described how to hook up LEDs to tell you which slot is active. The two active areas in the Multi-Pak are the CTS and the SCS areas. The CTS is mapped from $C000 to $FEFF for CoCos 1 and 2 and from $C000 to $FDFF for the CoCo 3. The SCS is mapped from $FF40 to $FF5F on all three CoCos. These mapped areas can be switched to any of the four slots of the Multi-Pak, together *or* independently. That means you can have the CTS in Slot 4 and the SCS in Slot 2 if you want.

These memory areas can be switched both in hardware (via the switch on the front of the Multi-Pak) or in software (via one memory location). The switch is simple to operate; before turning the computer and Multi-Pak on, slide the switch to the desired slot number. When you turn the computer on, the active area (or slot) is identical to the slot number on the switch in front. The hardware switch cannot change the SCS and CTS separately, only both of them at the same time. Sliding the switch to another slot number with the power on will change slot access, and probably crash your software program at the same time. There is, however, a time when the switch no longer works to switch these areas.

Let's go back to the software switch. It, too, can change the active slot area; it does so by writing a number to a read/write byte in the memory map, the byte at $FF7F. This byte is divided into two nibbles (a nibble is four bits); the lower nibble controls the SCS area and the upper nibble controls the CTS. A value of 0 to 3 in any of these nibbles selects slots 1 to 4, respectively. One interesting thing this memory byte does, once you've written to it, is lock out the hardware switch. Sliding the switch on the front panel does not work after you have changed the slot access from software.

Now, both the newer and older Multi-Paks do the same thing. But because we don't have access to the latched bits on the newer board, the project I did back in 1985 will not work on the new Multi-Pak. The circuit I have come up with now works just like the older Multi-Pak's circuit, allowing you to hook up the LEDs as before.

The Project

This circuit requires just five chips. These chips can be mounted on a small PCB that you can get from any Radio Shack. It does not require an edge connector, because it does not connect to the slots of the Multi-Pak. Instead, you have to open up the thing and insert this circuit inside. This is not too bad, because you have to open it up anyway to get the LEDs in there.

Figure 1 shows the circuit in question. A step-by-step description will help you understand it. Let's start with U1 and U2: These chips are used to decode the memory map into one byte, Byte $FF7F, which is 16 bits long. Out of these 16 bits, 15 of them are 1s and only one of them is 0. The 74LS133 (U1) takes care of 13 of them. When all of these are high, the output goes low. This output goes to U1, a 74LS138, where the E clock, read/write line and the rest of the address lines are decoded. Only one output is used to write to the 74LS173, which is a four-bit latch used to record what slot is active.

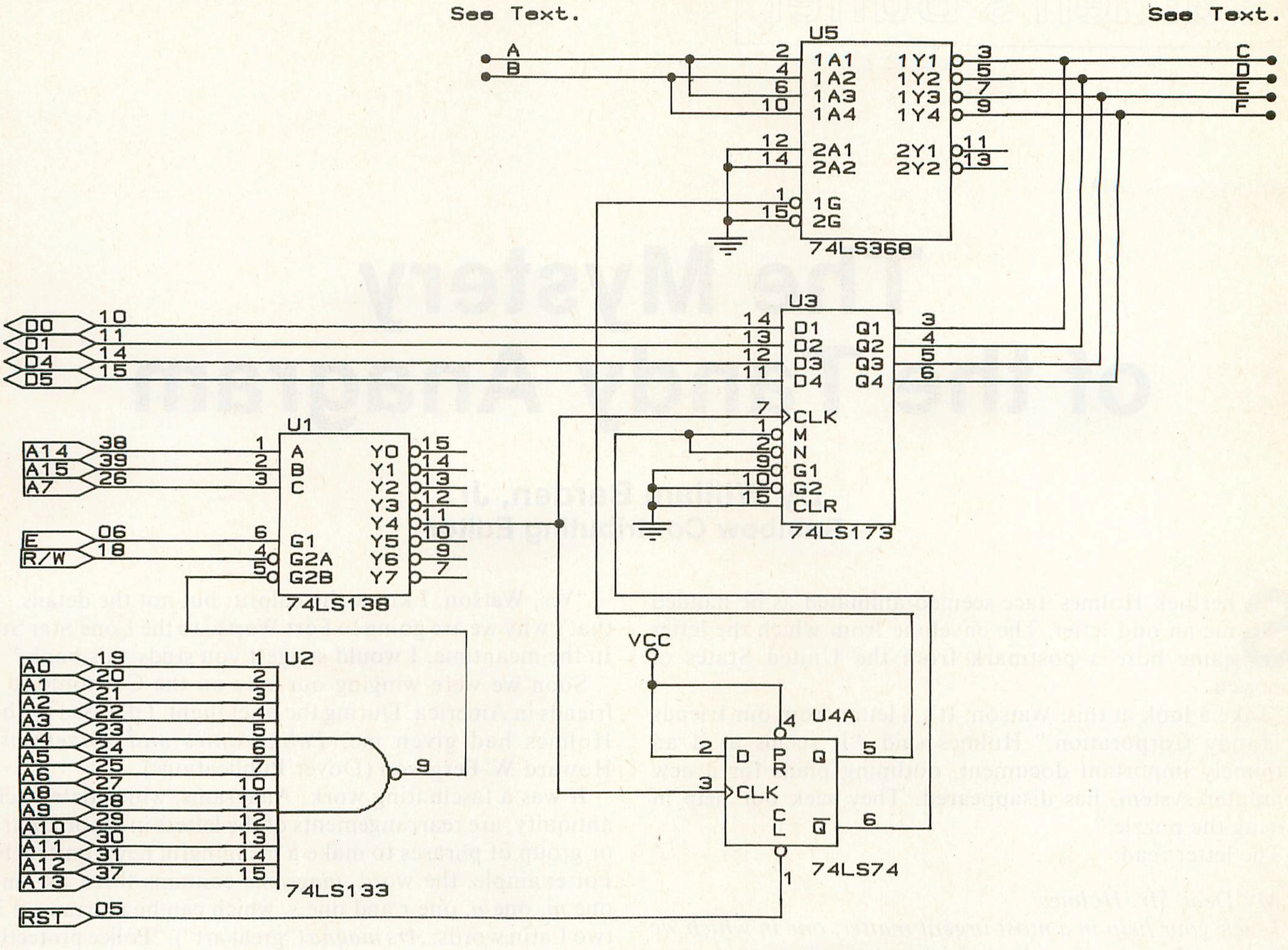
The 74LS368 is a six-bit buffer (we will use only four bits, however) whose input comes from the switches on the front of the Multi-Pak. You can get these signals from the 64-pin chip inside the Multi-Pak. The A pin in Figure 1 connects to Pin 21 of IC 6, and B connects to Pin 22 of the same chip. These two signals are split to form the four bits necessary for the LEDs. This is where the four connections of the LEDs project connect to. Here is the connection list for these pins:

Pin No.	U13 of LEDs Project
C	2
D	3
E	14
F	13

This chip (U5) will output the status of the front switch when the Multi-Pak is first turned on, due to the U4, a 74LS74. This is a D-type flip-flop. On power-up or reset, the Q (Pin 5) output of this chip is low, which activates U5. At the same time, *Q (Pin 6) is high,

---

Tony DiStefano is a well-known early specialist in computer hardware projects. He lives in Laval Ouest, Quebec.


See Text.
A
B
U5
2
4
6
10
1A1
1A2
1A3
1A4
1Y1
1Y2
1Y3
1Y4
3
5
7
9
See Text.
C
D
E
F
12
14
2A1
2A2
2Y1
2Y2
11
13
1
15
1G
2G
74LS368
U3
D0
D1
D4
D5
10
11
14
15
14
13
12
11
D1
D2
D3
D4
Q1
Q2
Q3
Q4
3
4
5
6
7
1
2
9
10
15
CLK
M
N
G1
G2
CLR
74LS173
U1
A14
A15
A7
38
39
26
1
2
3
A
B
C
Y0
Y1
Y2
Y3
Y4
Y5
Y6
Y7
15
14
13
12
11
10
9
7
E
R/W
06
18
6
4
5
G1
G2A
G2B
74LS138
VCC
U4A
4
2
3
D
P
R
Q
5
CLK
C
L
Q
6
1
74LS74
U2
A0
A1
A2
A3
A4
A5
A6
A8
A9
A10
A11
A12
A13
19
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21
22
23
24
25
27
28
29
30
31
37
1
2
3
4
5
6
7
10
11
12
13
14
15
9
74LS133
RST
05

Figure 1

which keeps U3 in activated (tri-state). U3 has to be kept in this state because no data has been assigned to it; that would give random values to the LEDs. On the other hand, U5 is activated to give the status of the switch, which conforms to the old Multi-Pak.

The output of U1 also goes to the clock input of U4, so when your software program writes to $FF7F, to change the active slot for the first time, it flips the outputs Q and *Q. This, in turn, deactivates U5 (connected to the switches) and activates U3. The new values just entered into the latch at U3 are now valid, and the flip-flop action of U4 brings this data out to the LEDs. From then on, changing the switch has no effect on the LEDs. The switch will have no effect until one of two things happens: Either a reset occurs or the power is turned off. Pressing the reset button will again flip U4 back to its original state and therefore re-enable the switches. Turning the power off also flips the condition of U4.

This project for the newer Multi-Pak is not very difficult, but you must have done (or do now first) the project from 1985 for this one to be useful. The standard project builder's kit is necessary. These parts are not available from Radio Shack, but are at most well-stocked electronics shops. Active Electronics is my best source for almost all the electronics parts I buy.

There is one more thing yet to do; The program I use to generate the circuit diagram in Figure 1 does not put in the pin numbers for 5 volts and ground. Figure 2 shows a list that explains which pin goes where in the power and ground department.

In the Multi-Pak, you can get 5 volts from Pin 9 of the connector and ground connections from pins 33 and 34.

Chip #	+5 Volts	Ground
U1	16	8
U2	16	8
U3	16	8
U4	14	7
U5	16	8

Figure 2

In my January 1988 column (Page 144), I requested that my readers send in a hardware projects "wish list." I have gotten a few responses.

Some have been good, and I will get to work on them, but some are a bit far-fetched. Try to keep your ideas limited to small projects — some guys asked to do a project that would cost several times the price of the computer, the Multi-Pak, my drives and then some!

Barden's Buffer

16K ECB

The Mystery of the Tandy Anagram

By William Barden, Jr.
Rainbow Contributing Editor

Sherlock Holmes' face seemed animated as he handed me an odd letter. The envelope from which the letter came bore a postmark from the United States of America.

"Take a look at this, Watson. It's a letter from our friends at Tandy Corporation," Holmes said. "It seems as if an extremely important document, outlining plans for a new computer system, has disappeared. They seek our help in solving the puzzle."

The letter read:

My Dear Mr. Holmes:

I seek your help in a most urgent matter, one in which we do not wish to involve the local law enforcement. A most secret document was stolen from one of our company executives. The future of the company may well depend upon it, and for that reason we do not wish the matter to be made public.

My name was signed on a note the thief left, and I am under suspicion.

Name your price, Mr. Holmes. We will be most pleased if you will help us in this matter.

Your humble servant,
Gil B. Ube
Vice President
Assembly and Dissembling

"My dear Watson, can Mrs. Watson spare you for a few days?"

"Of course, Holmes. As a matter of fact, she's at her sister's in Chesterfield."

"Then there's no time to lose, Watson. I fear the culprit may already be out of our reach!"

"But, Holmes, do you mean you have already solved the mystery?" I exclaimed.

"Yes, Watson, I know the culprit, but not the details. And that's why we are going to Fort Worth, to the Lone Star State! In the meantime, I would suggest you study this book."

Soon we were winging our way on the Concorde to our friends in America. During the brief flight, I perused the book Holmes had given me, *Palindromes and Anagrams* by Howard W. Bergeson (Dover Publications).

It was a fascinating work. Anagrams, which date back to antiquity, are rearrangements of the letters in a word, phrase, or group of phrases to make a meaningful new construction. For example, the word *anagrams* contains three *a*'s, one *g*, one *m*, one *n*, one *r* and one *s*, which can be rearranged into two Latin words: *Ars magna* ("great art"). "Police protection" becomes "Let cop cope in riot." "Real estate transaction" becomes "It's a neat sale or rent act." The more meaningful the new phrase, the better the anagram. From one phrase, it is sometimes possible to construct hundreds or even thousands of anagrams.

Charades are another form of anagrams. In charades, the letters are left in the same order, however. "Amiable together" becomes "Am I able to get her?"

Palindromes, the book went on to say, are not only anagrams, in which the same letters and number of letters are used in the new phrase, but the phrase reads the same forward and backward! The most famous palindrome is, perhaps, "A man, a plan, a canal — Panama!" Another famous palindrome is Napolean's lament, "Able was I ere I saw Elba."

A palindromic sentence is a structure in which the *words* read the same forward and backward, for example: "You can cage a swallow, can't you, but you can't swallow a cage, can you?" Long poems or narratives have been written using palindromes by letters or by words. The more meaningful the poem, the better the palindrome.

I set the book aside and turned to Holmes. "I say, Holmes, this is a capital book, but what does it have to do with the problem in Fort Worth?"

"All in good time, Watson, all in good time," said he.

The Concorde landed at the Dallas/Fort Worth air terminal, and we were whisked away by the Tandy Hyundai limousine. During the short drive from the terminal to One

---

Bill Barden has written 27 books and over 100 magazine articles on various computer topics. His 20 years' experience in the industry covers a wide background: programming, systems analysis and managing projects for computers ranging from mainframes to micros.

Tandy Center, Holmes was reflective, finger tips steepled together and elbows on knees.

We were met at One Tandy Center by Gil B. Ube, a Tandy vice president from Japan. He was a fit-looking businessman, dressed in traditional Tandy gray.

He offered us his hand in greeting.

"Ah, Mr. Holmes. I'm so happy you found the time to help us with our problem. And, I might mention, *my* problem, since the thief has used *my* name."

"Mr. Ube, it is my pleasure to be able to help. I am a longtime admirer of Tandy products, and have a Color Computer 3, a Tandy 1000 TX and a Model 102. And now, if you don't mind, perhaps we could see the scene of the crime?"

"Certainly, Mr. Holmes. Come this way, gentlemen."

We followed Mr. Ube to an elevator and presently found ourselves on the 15th floor of One Tandy Center. A great deal of construction was evident.

"Please excuse the mess — we're recarpeting mahogany row. It will be done shortly. This is the office of John Ochra, *capo de capo*."

"I see you are familiar with Italian, Mr. Ube."

"My mother's side of the family, Mr. Holmes."

"Ah, yes. Northern Sicily, I believe, about 40 kilometers from Palermo. The daughter of a wine merchant, I would say."

The executive expressed great surprise. "Why, Mr. Holmes! How could you have known that?"

"Tut, tut, Mr. Ube. I wrote a short monograph on Italio-Japanese accents some time ago. Pray continue."

"Mr. Ochra was sitting at his desk that night, reviewing our new Color Computer product — which, I'm sorry, I can't say much about, Mr. Holmes."

"Other than the fact that it runs at 20 MHz, uses a 68020, is multitasking, has 1,024-by-1,024 screen resolution with a palette of 1,024 colors, has a built-in, 80-megabyte disk drive, and sells for under $200 with monitor, neither can I, Mr. Ube," remarked Holmes. "I quite understand. Propriety is the lifeblood of computer companies these days."

The executive turned several colors never seen on a Color Computer and hesitantly continued.

"The product is defined in a 100-page specification marked TOP SECRET. Only two copies exist, and Mr. Ochra was reading one of them."

"Where is the other?"

"Locked quite securely in Mr. Ochra's safe. He verified that shortly after the theft.

"It was quite late, and Mr. Ochra was the only person on the floor. Leaving the document on the desk, he went downstairs to get some refreshment. However, hardly had he left the elevator on the first floor when he noticed by the control panel that a second elevator was stopping on the 15th floor. He immediately boarded the elevator and pressed the 15th floor button. When he arrived on the floor and reached his desk, he found, to his horror, that the document was gone. In its place was this note."

Holmes looked briefly at the note. It read:

> *Tandy, are you happy, really happy, you are Tandy?*
>
> *Gil B. Ube*

"As you can see by the note, Mr. Holmes, it was signed by me! And in my handwriting."

"I would not have expected less."

"Does it mean anything to you, Mr. Holmes?"

"Yes, I believe it does. May I keep this?"

"Please do."

"Tell me, Mr. Ube, had Mr. Ochra observed anyone else on his floor before that time?"

"Only a cleaning woman and a security guard. The cleaning woman arrived at 6 o'clock p.m. and left at 6:30. The security guard passed through briefly at 7:05 p.m., shortly before the theft."

"Mr. Ube, I believe I can find the answer. Might I impose upon you to borrow some computer equipment? I neglected to bring along my Model 102."

"Certainly, Mr. Holmes. Would a Color Computer 3 disk system be sufficient?"

"That will do splendidly, Mr. Ube. Might I also borrow a list of your employees? One with their names and job classifications will do nicely."

"We'll have the list for you in a moment, Mr. Holmes."

I did not see Holmes for the rest of the day. However, later in the evening, my telephone rang.

"Watson, come here, I need you," said Holmes' voice.

You may have the wrong Watson, I thought to myself, but answered, "On my way, Holmes!"

I hurried over to Holmes' room and knocked. When he opened the door I was amazed to find the room in great disarray. The bed was overturned, the Color Computer 3 equipment was in a jumbled mess on the floor, the room lamp was smashed, and papers were strewn about everywhere.

"Holmes, what happened?" I shouted, aghast.

"He's been here, Watson — my old nemesis. I left the room

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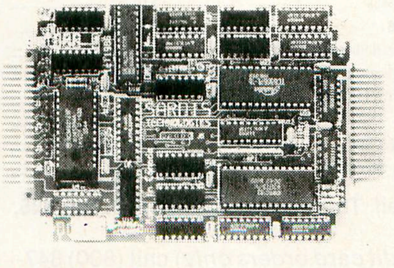

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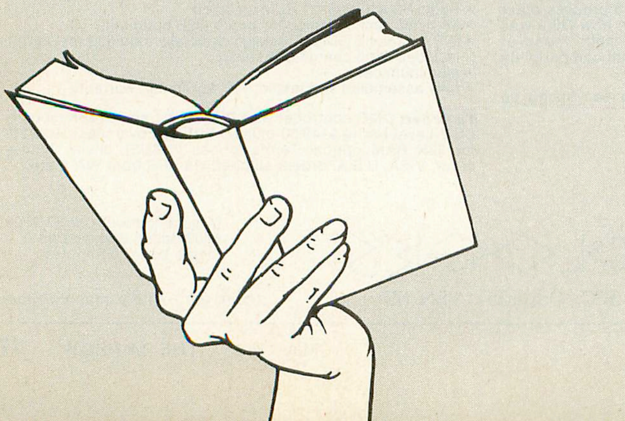

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for a brief moment to buy a copy of the *London Times* in the lobby. When I got back, I was greeted by this."

"Holmes, who has been here?"

"Moriarty, Watson. I have proven beyond a reasonable doubt that Moriarty has been undermining computer companies. Tandy is his latest effort. Help me get this room and computer equipment in order. In the meantime, please telephone Mr. Ube and have the Fort Worth police detain a Mr. James Y. Marriot."

I did as Holmes bid. However, I was informed by Mr. Ube that Mr. Marriot was nowhere to be found. He had disappeared shortly after lunch.

"Watson, I'm afraid that once again I have been too late to stop Moriarty. But possibly I can repair some of the damage he has done to Tandy. Please call Mr. Ube and have him assemble Tandy's executives."

I placed the call as Holmes requested. All conversation ceased as Holmes strode into the room, a Color Computer system under his arm.

"Gentlemen, how kind of you to come. Please forgive my delay in setting up this system."

Holmes set up the Color Computer and disk drive, and inserted a disk from his pocket. He stepped back and addressed the crowd.

"As some of you know, I have been a longtime admirer of Tandy computer products. I was therefore interested when I received this letter from your Mr. Ube.

"Something about the nature of the crime reminded me of recent events in American computer companies. I was immediately convinced that your Mr. Ube was not the criminal. Following that logic, I used a list of names of your current employees for processing by one of your wonderful machines. Let me show you what I mean."

Holmes turned to the Color Computer and loaded a BASIC program.

"This program will take any characters entered and shuffle them around to make new words or phrases. This type of rearrangement is called an anagram. Only the letters used in the original words or phrases are used. Let's take the name James Y. Marriot, from the man whom I understand is not at this meeting because he has disappeared. When the letters j-a-m-e-s-y-m-a-r-r-i-o-t are entered into this program, the computer will rearrange the letters in all possible permutations.

"One question that may spring to mind is in regard to the number of permutations. Suppose we had two letters — call them *a* and *b*. There are only two arrangements of these letters — *ab* and *ba*. Now suppose we had three letters *a*, *b* and *c*. We could have *abc*, *acb*, *bac*, *bca*, *cab* and *cba*, a total of six in all. If we used the letters in Mr. Marriot's name, we would have 13 letters with which to work. There are 13 choices for the first letter, 12 choices for the second letter — as one letter has been used from the pool of 13 letters — 11 choices for the third letter, and so on, down to one choice for the last letter. In fact, there are

13 x 12 x 11 x 10 x 9 x 8 x 7 x 6 x 5 x 4 x 3 x 2 x 1

choices, or over 6,227,020,800 rearrangements! There's a name for this formula; it's called *factorial*. You'll find the factorial symbol (!) used a great deal in higher mathematics, as I'm sure some of you are aware, with the possible exception

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of the marketing people. However, in Mr. Marriot's name, the *a* and *r* repeat, so the actual number is somewhat less.

"The programme here lists all of these combinations, but I soon realized that it would take over 197 years at one combination per second. I then modified the programme to simply help in decoding anagrams. The user first enters the entire list of letters, and then enters a word or words. The programme makes certain that the words are in the common pool of letters and then lists all remaining letters in different combinations.

"Now watch what happens when I put in the letters j-a-m-e-s-y-m-a-r-r-i-o-t and then the word *james*. The remaining letters y-m-a-r-r-i-o-t are used to form 8! words, 40,320 arrangements in all. The 21,233nd arrangement is M-O-R-I-A-R-T-Y, a man well-known by me, a master computer criminal and hacker, and skilled in the binomial theorum. I will not run through all of them, gentlemen, but you undoubtedly get the idea.

"Mr. Marriot is employed as a security guard, and is one of the people who had access to the 15th floor without creating any suspicions whatsoever. I understand, however, that Mr. Marriot has now disappeared."

"Do you mean to say that Marriot is the thief, Mr. Holmes?" asked Mr. Ube.

"Not only is he the thief, but he has systematically undermined several computer companies in the course of his career in the last 10 years. It was he who was responsible for the demise of the Timex Computer Division by its late introduction of the Timex 2068. It was he who introduced delays in the Osbourne MS-DOS machine. It was he who was instrumental in the firing of Steven Jobs at Apple. He went under a variety of names in these companies, but he could not resist flaunting his anagrammatic talent — they were all anagrams of James Moriarty — James Y. Tramori, Jamie Trysmora, James Y. Armorit, and others.

"At Tandy he was working his evil ways in the safe guise of a security guard. As a guard, he had access to all areas. And with his extensive knowledge of computers, he could easily alter company memoranda, change design specifications, or perform other acts designed to sabotage even a well-run company such as Tandy. We can only hope that he was not able to work too much damage.

"My suspicions about Mr. Marriot were confirmed when I saw the note he had left in place of the manuscript. Recall that it was signed by Mr. Ube:

Tandy, are you happy, really happy, you are Tandy?

Gil B. Ube

"This is a *sentence* palindrome — a sentence that reads the same forward or backward. It was Moriarty's final signature."

"But, Mr. Holmes, where is Moriarty now?" asked Mr. Ube.

"I expect he'll show up at Dell Computer, or Apple, or Atari, and undoubtedly in a disguise created by the surgeon's knife."

"But why does he attempt to destroy computer companies?"

"His employer dictates it."

"His employer?"

"Come, come, Mr. Ube. His employer was the reason he was able to use your name on the document. If you transpose your signature in an anagram, you'll see what I mean."

Mr. Ube thought for a moment and wrote on a convenient pad. "Oh, *that* company!" he exclaimed.

"Mr. Holmes, we don't know how to thank you. It's just unfortunate that Moriarty saw the specifications for our new computer."

"But he didn't, Mr. Ube."

"What do you mean, Mr. Holmes?"

"Moriarty made a thorough search of my room at the hotel. There was no reason for him to search my room unless he thought I had a copy of the plans. Fortunately, Mr. Ochra interrupted Moriarty's theft just in time. Remember that the document was in a bright red cover with TOP SECRET marked in bold letters. Even his fellow security guard in the downstairs lobby would notice the bulky document. Instead, he decided to hide the document and come back to retrieve it at a later time. He actually discarded it in his mad dash away from Mr. Ochra's office."

"But why wasn't he able to retrieve it, Mr. Holmes?"

"By a fortunate coincidence, the floor was undergoing remodeling, and the document was taken away the next day, together with the other documents with which it was stored. They were returned only today, and by then, he was discovered. Unless I miss my guess, gentlemen, you'll find it in that bookcase over there."

Several of the executives hurried over to the bookcase, which was crowded with multi-colored documents.

"Here it is!" exclaimed one.

"And so, Mr. Ube, I trust you will be more careful about security men in the future?" Holmes exclaimed as he took the proffered check and airline tickets. "Come, Watson, we have just time for a meal at Joe T. Garcia's before the Concorde departs."

* * *

Palindrome Program

The palindrome program in Listing 1 allows you to enter a string of characters, words or sentences and test whether what you've entered is a character palindrome — a word, phrase or sentence that has the same characters backward and forward. Spaces and punctuation are automatically discarded. For example, the exchange in entering the palindromic sentence "Draw, O Caesar, erase a coward!" would look like this:

```
WORDS: DRAW, O CAESAR, ERASE A COWARD!
PALINDROME-BOTH STRINGS ARE
DRAWOCAESARERASEACOWARD
WORDS: _
```

If the characters do not form a palindrome, both the original and reverse are printed for comparison:

```
WORDS: RATS LIVE ON NO EVEL STAR
NO PALINDROME
ORIGINAL:RATSLIVEONNOEVELSTAR
REVERSE: RATSLEVEONNOEVILSTAR
WORDS:
```

The program will run on any CoCo with Extended BASIC. Characters should be entered in uppercase.

Letter Count Program

The letter count program in Listing 2 breaks down characters, words, phrases or sentences into the number of letters, arranged in sequence. This can be helpful in making up words for palindromes or anagrams. It's always interesting to note the large number of vowels in both palindromes and anagrams. Note the following:

```
WORDS: MADAM, I'M ADAM!
AAAA
DD
I
MMMM
WORDS: _
```

The program will run on any CoCo with Extended BASIC, and, again, characters should be in uppercase, but spaces and punctuation can be used.

Permutations Program

The permutations program in Listing 3 lists all permutations of from two to 10 letters. Sherlock Holmes used a BASIC09 version of this program in an earlier story ("The Mystery of the Novice Bell Ringer," November 1987, Page 174). The program there was a *recursive* program that called *itself*. Recursion is not possible in Extended BASIC (without a good deal of trouble, that is), but the program in Listing 3 will handle up to 10 letters. Permutations of two letters are *AB* and *BA* (1*2). Permutations of three letters are *ABC*, *ACB*, *BAC*, *BCA*, *CBA* and *CAB* (1*2*3). There are 24 permutations of four letters (1*2*3*4), 120 permutations of five letters (1*2*3*4*5), 720 permutations of six letters, 5,040 permutations of seven letters, 40,320 permutations of eight letters, 362,880 permutations of nine letters, and 3,628,800 permutations of 10 letters. The seven-letter case displays in about 15 minutes, but you can see that the cases involving a larger number of letters are not too usable.

A partial list of the anagrams of the letters in the word *BARDEN* are displayed as follows:

```
WORDS: BARDEN
BARDEN  BARDNE  BAREND  BAREDN . . .
```

BARDEN yields names I had never thought of, like *BRENDA* and the dubious *BARNED*, and also combinations from which palindromes could be made.

The program works by a series of *nested calls to* eight routines. At the bottom, the routine switches the last two letters of the current string. For example, *XXXXAB* would be switched to *XXXXBA*. Two swaps are made to restore *XXXXAB* to the original. The routine above calls this routine three times, thus rotating three letters with two rotations of two letters for each call. For example, *XXXABC* would be changed to *XXXBCA* and then two calls would be made to the lower routine for *XXXBAC* and *XXXBCA*; the letters would then become *XXXCAB*, with two calls for *XXXCBA* and *XXXCAB*; the letters would then become *XXXABC*, with two calls for *XXXACB* and *XXXABC*. With each shift to the left, one more letter must be rotated, and subsequent calls are made to the lower routines.

Like the previous programs, spaces and punctuation are discarded before the display is done. The `ON LEN(A$)` statement branches out to the proper level based upon the length of the input string.

The rotate subroutine performs a left rotation of all or a portion of the word. For example, if the subroutine is called with `J=5` and the letters are *ABCDEFGH*, the subroutine will set `J` equal to `LEN(A$) - 5 = 8 - 5 = 3` and produce *ABC* plus the left rotation of *DEFGH*, *EFGHF*. The result will be

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ABCEFGHF. For a word of six letters, the subroutine is called 720 times.

FREEWALL for now. See you next month with more CoCo topics. ☐

Listing 1: PALINDRM

```
100 ' PROGRAM TO REVERSE STRING
TO CHECK FOR PALINDROMES
110 CLEAR 2000
120 CLS
130 LINE INPUT "WORDS: "; WD$
140 B$ = ""
150 FOR I = 1 TO LEN( WD$ )
160 A$ = MID$( WD$, I, 1 )
170 IF ( A$ > CHR$( 64 ) ) AND (
 A$ < CHR$( 91 ) ) THEN B$ = B$
+ A$
180 NEXT I
190 C$ = ""
200 FOR I = LEN( WD$ ) TO 1 STEP
 -1
210 A$ = MID$( WD$, I, 1 )
220 IF ( A$ > CHR$( 64 ) ) AND (
 A$ < CHR$( 91 ) ) THEN C$ = C$
+ A$
230 NEXT I
240 IF B$ = C$ THEN PRINT "PALIN
DROME-BOTH STRINGS ARE ": PRINT
B$
250 IF B$ <> C$ THEN PRINT "NO P
ALINDROME": PRINT "ORIGINAL:"; B
$:PRINT "REVERSE: " C$
260 GOTO 130
```

Listing 2: LETTERS

```
100 ' PROGRAM TO COUNT NUMBERS O
F LETTERS
110 CLEAR 2000
120 DIM L( 26 )
130 CLS
140 LINE INPUT "WORDS: "; WD$
150 FOR I = 0 TO 25: L( I ) = 0:
 NEXT I
160 FOR I = 1 TO LEN( WD$ )
170 A$ = MID$( WD$, I, 1 )
180 IF ( A$ > CHR$( 64 ) ) AND (
 A$ < CHR$( 91 ) ) THEN L( ASC(
A$ ) - 65 ) = L( ASC( A$ ) - 65
) + 1
190 NEXT I
200 FOR I = 0 TO 25
210 IF L( I ) <> 0 THEN FOR J =
1 TO L( I ): PRINT CHR$( I + 65
);: NEXT J: PRINT
220 NEXT I
230 GOTO 140
```

Listing 3: PERMS

```
100 ' PROGRAM TO LIST ALL PERMUT
ATIONS OF A PHRASE
110 CLEAR 2000
120 PRINT
130 LINE INPUT "WORDS: "; WD$
140 A$ = ""
150 FOR I = 1 TO LEN( WD$ )
160 B$ = MID$( WD$, I, 1 )
170 IF ( B$ > CHR$( 64 ) ) AND (
 B$ < CHR$( 91 ) ) THEN A$ = A$
+ B$
180 NEXT I
190 ON LEN( A$ ) GOTO 190,360,34
0,320,300,280,260,240,220,200
200 FOR K = 1 TO 10: GOSUB 220:
J = 10: GOSUB 380: NEXT
210 END
220 FOR L = 1 TO 9: GOSUB 240: J
 = 9: GOSUB 380: NEXT
230 IF LEN( A$ ) = 9 THEN GOTO 1
20 ELSE RETURN
240 FOR M = 1 TO 8: GOSUB 260: J
 = 8: GOSUB 380: NEXT
250 IF LEN( A$ ) = 8 THEN GOTO 1
20 ELSE RETURN
260 FOR N = 1 TO 7: GOSUB 280: J
 = 7: GOSUB 380: NEXT
270 IF LEN( A$ ) = 7 THEN GOTO 1
20 ELSE RETURN
280 FOR O = 1 TO 6: GOSUB 300: J
 = 6: GOSUB 380: NEXT
290 IF LEN( A$ ) = 6 THEN GOTO 1
20 ELSE RETURN
300 FOR P = 1 TO 5: GOSUB 320: J
 = 5: GOSUB 380: NEXT
310 IF LEN( A$ ) = 5 THEN GOTO 1
20 ELSE RETURN
320 FOR Q = 1 TO 4: GOSUB 340: J
 = 4: GOSUB 380: NEXT
330 IF LEN( A$ ) = 4 THEN GOTO 1
20 ELSE RETURN
340 FOR R = 1 TO 3: GOSUB 360: J
 = 3: GOSUB 380: NEXT
350 IF LEN( A$ ) = 3 THEN GOTO 1
20 ELSE RETURN
360 FOR S = 1 TO 2: J = 2: PRINT
 A$,: GOSUB 380: NEXT
370 IF LEN( A$ ) = 2 THEN GOTO 1
20 ELSE RETURN
380 ' SUBROUTINE TO ROTATE PORTI
ON OF WORD
390 ' ENTER WITH J=# OF LETTERS
IN GROUP
400 ' ENTER WITH A$=WORD
410 ' EXIT WITH A$=ROTATED WORD
420 J = LEN( A$ ) - J
430 B$ = RIGHT$( A$, LEN( A$ ) -
J )
440 B$ = RIGHT$( B$, LEN( B$ ) -
 1 ) + LEFT$( B$, 1 )
450 A$ = LEFT$( A$, J ) + B$
460 RETURN
```

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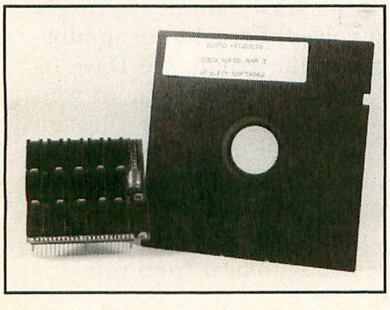

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Patches, Programs and Politics

By Dale L. Puckett
Rainbow Contributing Editor

Things are looking up. One day last week I received a new issue of *MOTD* from the OS-9 Users Group. The next day the mailman brought *Home Publisher*, Tandy's new desktop publishing program for the Color Computer 3. During the weekend, I started using an alpha test copy of *Wiz2* from Bill Brady, and I had time to dive into Computerware's fantastic window-based database manager, *Data Master*.

Dave Kaleita, the OS-9 Users Group's take-charge president, is really getting the group moving. The new 12-page *MOTD* looks great, thanks to Editor Bill Brady's skills with the *Ready Set Go* desktop publishing program. It's printed on 8-by-10 paper and can easily be saved in a three-ring binder. A ballot printed on Page 11 of *MOTD* gives you a chance to vote for a new slate of officers.

Brady writes that he is "downright excited." He expects many new OS-9 users in the near future and predicts that OS-9 is quickly coming out from "underground." He cites the fact that Personal OS-9 is now available for the Atari ST, which runs a 68000 processor. He also notes that OS-9 Level II on the Color Computer is just about the most effective, mature operating system available in the personal computer world.

Brady passed kudos to Microware for picking up the pieces of the Atari ST port after TLM Systems dropped it. The ST port marks the first time Microware, having dealt only with large companies like Tandy, has sold operating systems directly to the public. In fact, Microware now runs its own SIG on CompuServe to help its customers. Just type `GO MSC` for help.

Here's a tip you may find handy if you, like Brady, own several different computers — or use a different computer at the office — and want to transfer graphics images between them. When you type `GO PICS` on CompuServe, you enter a SIG designed to let you exchange pictures with anyone using any computer. Utilities are posted there that let you translate a graphics file created on your Color Computer into a `.GIF` file.

The idea is to convert your image into a `.GIF` file and upload it to the Pics SIG where other computer users can download it and display it on their screens. For example, if a Macintosh user saw a CoCo image and wanted to print it in a newsletter, he would run a utility designed to translate the `.GIF` file into a *MacPaint* file and then upload it.

This is precisely how Brady was able to print several screen images of *Multi-Vue* in his first *MOTD*. Kevin Darling saved the images in the familiar `.VEF` format and then ran one of the utilities to convert them to `.GIF` files. He sent them to Brady in the `.GIF` format, and Bill used the `.GIF`-to-*MacPaint* utility to convert them to a file he could pour into *Ready Set Go*. Magic.

While we're on the subject of *MOTD*, Kaleita says he hopes the present issue generates enough membership renewals that he will be able to have Brady publish one every other month. The OS-9 Users Group's address is Suite R-237, 1715 East Fowler Ave., Tampa, FL 33612. Inexpensive access to the group's outstanding public domain software library is worth the price of admission — $25 for one year's dues. *MOTD* is a bonus, a valuable and nice-looking one at that.

Since Kaleita has assumed command, things have really started to happen with the Users Group. In fact, this past weekend I had the pleasure of joining the Users Group's elected officers in a conference on RAINBOW's Delphi OS-9 Online SIG. Like any good leader, Kaleita has delegated many of the tasks of the organization to his board of directors. And he's given his troops enough responsibility to get the job done.

Perhaps you would like to get involved. Kaleita's officers hope so. In fact, during the conference they spent more than several minutes trying to figure out a way to make it possible for the group's many volunteers to get directly involved. For additional information about the group, see Dave or George Dorner — and who knows who else will show up — at the Chicago RAINBOWfest. Or, drop a quick note to any of the officers on the Delphi OS-9 Online SIG; their usernames are OS9UGP, OS9UGVP, OS9UGS and OS9UGE. They'll be happy to hear from you.

Dale L. Puckett, who is author of The Official BASIC09 Tour Guide *and co-author, with Peter Dibble, of* The Complete Rainbow Guide to OS-9, *is a free-lance writer and programmer. He serves as director-at-large of the OS-9 Users Group and is a member of the Computer Press Association. Dale is a U.S. Coast Guard lieutenant and lives in Rockville, Maryland.*

Wiz2 on the Horizon

Wiz2, from Bill Brady, promises to be one of the best communications programs on any microcomputer. I have tried both *Red Ryder* on the Macintosh and *ProComm* on the IBM PC. Both are outstanding products and lead the pack on their machines, but *Wiz2* offers more functionality and ease of use than both of these programs.

Wiz2 is an advanced communications program for users with special needs, yet it's the easiest terminal program to install and run on an OS-9 based Color Computer 3. Not bad for a product that was born for only one reason — to demonstrate to software developers and OS-9 users alike the gargantuan programming power lying dormant in BASIC09.

Wiz2's esthetic appeal is made possible by the windowing system built into OS-9 Level II, easily accessible from BASIC09. The interactive nature of BASIC09 lets Brady deliver his masterpiece quickly. Its modularity lets him build the program from a number of small modules that are relatively easy to write and maintain.

Here's the good news! When *Wiz2* is released sometime this summer, the original *Wiz* will not be taken off the market. If you buy *Wiz* before *Wiz2* is released, you will be able to upgrade to *Wiz2* at a small cost by using the coupon found inside the original *Wiz* manual. This means you don't have to wait for *Wiz2* to experience the *Wiz* communications environment. Once you've used the friendly, menu-driven, window-based *Wiz*, you'll never want to go back to a command line-oriented communications program.

The alpha test version of *Wiz2* that we are running now has a two-line billboard and status window along the top of the screen. A single line at the bottom of the screen gives you status information during a file transfer and takes your input if you go into conference mode — or go online temporarily while "editing" your data buffer.

"Buffer editor" is probably not the right name for a new feature that puts *Wiz2* miles ahead of the competition. Yet neither Brady nor Kevin Darling could think of a good name to describe it. In fact, I couldn't think of a name either, but let's take a look.

When you hold down the ALT key and strike the up arrow key, *Wiz2* opens a new 12-line overlay window and displays some of the text you have been receiving. You can use the up and down arrow keys to scroll through the last 8,000+ characters received in your buffer. If you find something you want to save or print, you can mark it and send it to the printer or take a snapshot and send it to your disk.

Here's a list of *Wiz2* "buffer editor" commands:

q	quit
t	mark top
b	mark bottom
f	find
g	goto
e	eject page
z	reset — or unmark text
s	snap marked text to disk
p	send marked text to printer
o	go online

A typical scenario might read like this. You see a message scroll by that you want to save for future study. After you finish the task you were already busy with when the message displayed on the screen, you press ALT and the up arrow to work in your edit buffer. You quickly find the message by pressing F. Seconds after you press ENTER, *Wiz2* displays the line that contains your subject.

You then strike the up arrow key to move to the top of the message. When the cursor arrives on the first line, press T to mark the top. Then use the down arrow key to move to the last line of the message. As you move through the buffer, the text that you pass is highlighted. When you arrive at the last line of the message, and it is highlighted, press B for bottom. Then press P and a copy of the message is sent to the printer. A Q closes the overlay window and puts you back online normally.

If you need to go online and make a quick comment while working within the buffer, you can press O for online. When you do this, *Wiz2* displays online copy in the two-line status window at the top of the screen and accepts input from you on the single-line window at the bottom of the screen.

I hooked up my CoCo 3 with *Wiz2* to an amateur radio receiver connected to a packet radio terminal monitoring a DX tracking network and set out to test *Wiz2*. It worked like a charm, but I quickly dreamed up a "wish list" and gave Brady a call. We kicked around some ideas, and he's working on them now. That's one of the reasons he hasn't committed himself to a delivery date for *Wiz2*.

When *Wiz2* does hit the street, you will be able to set up your own environment. This means you will have total

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control over *Wiz2* windows, and will be able to select the screen's type, color and size — within reason and the limits of a 24-line screen.

For example, if you rarely use *Wiz*'s interactive graphics mode, you will want to configure your copy of *Wiz2* to run in text-only screens. Windows will open up to three times faster, and text will scroll by on the screen much more quickly. Additionally, you'll be able to use more colors in a screen than you can when you run in a slower graphics screen.

Data Master Does Windows

We finally got a chance to fire up *Data Master*, the new OS-9 database manager from Paul and Sue Searby at Computerware, 4403 Manchester Ave., Suite 102, Box 668, Encinitas, CA 92024. This program can read old files you created under *Databank Manager* or *OS-9 Profile*. It can also read files created by *DynaCalc* — or write out its own information in a form that can be read by *DynaCalc*.

To run *Data Master*, you create an 80-by-24, Type 2 window and start an OS-9 shell in it. At that point, you need only type `DM` to run this program — assuming, of course, that you have stored a copy of the file `DM` in your current execution directory. Once *Data Master* is running you really don't need a manual. Basically, the only thing you need to know is that you can see the items in the first menu by pressing the slash key (/). When you've done this, a menu window pops down under the Desk menu.

Like all professional OS-9 programs, *Data Master* gives you direct access to the OS-9 shell from within the program. And like any good database program, it validates your data for you while you are typing it. Other important *Data Master* features include its ability to restructure a data file and the ability to compress your files by permanently removing all deleted records (useful when you need to save disk space).

More on Packet Radio

During the past month, we spoke with John Lind, KD7XG, Orange Section Technical Coordinator of the American Radio Relay League, and received both bad and good news. The bad news is that John has discontinued his project to port the WA7MBL packet bulletin board program to OS-9. As he owns a CoCo 2, which limits him to 64K of memory, he decided after a few starts that it just wouldn't fit. He didn't believe he could get the capability out of the program with such limited memory.

The good news is that he has written an impressive high frequency propagation program in OS-9 PASCAL. He reports that it screams when compared to a C program he had written earlier. He promises to send in several procedures that demonstrate how to exercise the OS-9 windowing and graphics environment from within PASCAL. We'll share them with you when they arrive.

Lind is also writing a satellite orbit prediction program in OS-9 PASCAL. Run from his CoCo, the program will drive an automatic antenna controller, which is itself a Z-80 microprocessor with 8K of RAM. His ultimate goal is to provide an automatic satellite link for his packet radio bulletin board. He has some interesting challenges ahead, because he must come up with a way to compensate for the Doppler shift on the radio uplink to the satellite.

On the Color Computer Packet Radio Bulletin front, I learned this week that WJ5W has written a BBS for RS-DOS. Better yet, Robert Billson, KC-

OS-9 SOFTWARE from D. P. JOHNSON

L1 UTILITY PAK - Contains 40 useful utilities that run under both level I and II OS-9. Included are a complete set of "wild card" file handling utilities, a disassembler, a disk sector editor, and the MacGen command language compiler. MacGen will allow you to generate many useful command macros in minutes, much more useful than procedure files. Macro source is included for a macro to implement an archival backup type function. **$49.95**

L2 UTILITY PAK - Contains a Level II "printerr" function that also **shows the pathname being searched for** when "not found" or permission type errors occur. Also contains level II software ram disk driver. Ten other utilities included, some useful for level I also. **$39.95**

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SDISK3 - Level II version of SDISK driver. Same features as level I (except bootfix not required to boot from double sided). **$29.95**

PC-XFER UTILITIES - Programs to format and transfer files to/from MS-DOS^{tm} diskettes on CoCo under OS-9. (Requires either SDISK or SDISK3 to run depending on which level of OS-9 you are using) **$45.00**

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D. P. Johnson, 7655 S.W. Cedarcrest St.,
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You may also contact D. P. Johnson (see left) to answer your technical questions about the DISKMASTER system.

About The One-Liner Contest . . .

THE RAINBOW's One-Liner Contest has now been expanded to include programs of either one or two lines. This means a new dimension and new opportunity for those who have "really neat" programs that simply just won't fit in one line.

Here are the guidelines: The program must work in Extended BASIC, have only one or two line numbers and be entirely self-contained — no loading other programs, no calling ROM routines, no poked-in machine language code. The program has to run when typed in directly (since that's how our readers will use it). Make sure your line, or lines, aren't packed so tightly that the program won't list completely. Finally, any instructions needed should be *very* short.

Send your entry (preferably on cassette or disk) to:

THE RAINBOW
One-Liner Contest
P.O. Box 385
Prospect, KY 40059

2WZ, is porting that program to OS-9.

Recently I copied a message from an amateur packet radio operator in Pennsylvania asking for some information about the RS-232 pack and OS-9 terminal programs. I sent him a message, and the next day I had a thank-you message back and a request for more information. Earlier in the week I sent an anniversary message to my parents in Kansas via packet radio. They received a call from a local ham with the message less than 18 hours after I sent it. Hams are using ZIP code forwarding in their packet bulletin board programs to accomplish this magic. There is already a Color Computer version of the *W0RLI* bulletin board available on CompuServe's HamNet. I hope to come up with something for OS-9 soon.

Packet radio communications isn't the only radio mode that can use the services of your Color Computer and OS-9. Jerry Murphy, a ham operator in the Cleveland area, uses *Wiz* to download weather maps from WLO in Atlanta and from CFN in Halifax. He lets *Wiz* capture the maps and write them to disk overnight. In the morning, he prints up the maps and passes them to ships at sea on the 20-meter maritime mobile net. Murphy was the net manager of the Hurricane Net for 25 years before retiring from the job last year.

Shell3 and a Few Tips

Last month we introduced you to *Shell+*. We've used it for almost two months now and don't know how we got along without it. Now, however, there's more — *Shell3* has arrived. You'll find it in a data library on your favorite online SIG.

Kevin Darling and his partners have added `pxd` and `pwd` to the list of features built into *Shell*. They have also made it possible for you to take the name of your current data directory and make it part of your prompt. You do this by typing `$` when you change prompts. `#` prints the process number, `@` prints the current device name, and `$` will show the name of your working data directory.

Another important *Shell3* enhancement is the fact that the program will accept a command line in which you have already typed the parentheses and quotes. This caused a problem with *Shell+* when you ran programs like *Sculptor* that insert these delimiters for you.

During the two months we have used *Shell+*, we have grown quite fond of the append and overwrite features. For example, you can append a favorite listing to an existing file by typing `list favorite >+ FileWithItAll`. Or, if you want to merge a new module into your *Shell* file, you can do so by typing `merge NewModules >+ NewShellFile`. It's a great shortcut!

Here's another! We recently heard about a guy who has set up *Multi-Vue* with icons for all the great CoCo 3 game programs. His 6- and 10-year-old sons now boot up *Multi-Vue* and run their own games — when they want them. No adult supervision required.

Cray Augsburg forwarded a letter to us recently from Ronald W. Wilson, who was looking for a quick lesson in printing from BASIC09. You'll find the secret in the short procedure shown in Figure 1, Ron.

More Tips

One of the problems you run into when you start working with large BASIC09 programs like *KISSDraw* is a shortage of memory in your 64K process area. The problem is also especially

```
procedure DemoPrint

DIM printer:INTEGER

OPEN #printer, "/p": WRITE

(* You now have a path open to the printer

(* and can use it at will.  For example:

PRINT #printer, "Now testing a DMP-105 printer!"

CLOSE #printer

END
```

Figure 1

TEXTPRO-IV

"The ULTIMATE Color Computer III Word Processing System"

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TEXTPRO IV is the most Powerful Word Processing System available for the OCO-3, designed for speed, flexability and extensive document processing. It is ot like most of the other word processing programs available for the Color omputer. If you are looking for a simple word processor to write letters or other ort documents, and never expect to use multiple fonts or proportional printing, en most likely you'll be better off with one of the other simple word processors. ut, if you want a powerful word processor with extensive document formatting atures to handle large documents, term papers, manuals, complex formatting oblems and letter writing, then TEXTPRO IV is the answer. It works in a tally different way than most word processing programs. It uses simple 2 aracter abbreviations of words or phrases for commands and formatting formation that you imbed directly in your text. There are over 70 different rmatting commands you can use without ever leaving the text your working on. here are no time comsuming and frustrating menu chases, you are in total ontrol at all times. You can display the formatted document on the screen before single word is ever printed on your printer. Including margins, headers, footers, age numbers, page breaks, column formatting, justification, and Bold, Italic, nderline, Double Width, Superscript and Subscript characters.

TEXTPRO IV can even support LASER PRINTERS with proportional fonts. ke a good look at this AD? It was done with TEXTPRO IV on an OKIDATA ASERLINE-6 laser printer!!! All of the character sets used on this AD are roportional, all centering, justification, font selection, and text printing was erformed automatically by TEXTPRO IV.

What you see is what you get!

TEXTPRO IV has 9 Hi-Resolution screen fonts to choose from, with 58 to 212 haracters per line in 225 Resolution, for the best display possible. You can easily atch the width of your printed page to the screen and you can have it utomatically change display widths as you change printer fonts so you can even isplay the "fine print". All of the screen fonts can display, Bold, Italic, Underline, uperscript, Subscript and Double Width characters. When you you want to see hat your printed document will look like, TEXTPRO IV will let you see it on the creen in all its glory, so that, "What you see is what you get".

Standard Commands

TEXTPRO IV has all the document formatting commands you expect in a ord processor and then some. The setup commands include: line length, top argin, bottom margin, page length, page numbering on/off, page format on/off, utomatic word fill on/off and justification left, center, right or full. Some of the ertical control features include: Test for a number of lines left on a page, skip to ext page, set page number, page pause, single and multiple line spacing.

TEXTPRO IV features 3 programmable Header lines that can be centered, left r right justified and one programmable Footer line. There are 3 commands for ontinious, single and paragraph indenting, Center Text, Center Line and Right ustify text with character fill.

Printer & Special Commands

TEXTPRO IV has 8 pre-defined printer & screen commands for Bold, Italic, ouble Width, Underline, Subscript, Superscript, Condensed and Double Strike rint. It also has 10 programmable functions that you can use to access intelligent rinter features like: Graphics, variable line spacing, half line feed, horizontal & ertical positioning. There are also 3 other printer commands that allow you to nbed control code sequences anywhere in the text.

There is a Footnote command that will automatically place footnotes at the ottom of the page. Another command allows you to display a message on the creen and input text from the keyboard, to be included in your printed document. here is also a repeat command that allows you to repeat an entire document or art of one, up to 255 times.

Tab Functions

TEXTPRO IV features an elaborate system of tab commands for complete ontrol over column formatting. There are 10 programmable tab stops that can be efined and re-defined at any time. They can be used to: Center over Tab olumn, Right Justify to Tab column, Decimal Align over Tab column, Left ustify to Tab column (Normal Tab) and Horizontal Tab. They can also be used ith a numeric column position for maximum flexibility.

Proportional Fonts & Printing

TEXTPRO IV is the only Color Computer III Word Processing system that gives you Justified Proportion Printing, which can give your documents and letters that professional touch that just isn't obtainable with fixed or mono spaced printing. And just about all printers today support proportional fonts, and with Laser Printers you can get typesetting quality output for just pennies a page. TEXTPRO IV supports up to 9 proportional fonts, with full justification. And, you can even mix mono spaced and proportional fonts for maximum flexability. Even if you don't use proportional printing, you can select between Pica, Elite and Condensed fixed width fonts to get fully justified printing.

Mail Merge and Text Processing Disk Functions

TEXTPRO IV supports several commands that allow you to import data or text from other disk files. They allow you to include information like names and addresses for Mail Merge capability, Import standard paragraphs or other information for Boiler Plate type functions and more. Some of the commands include: Open a file, Field a Record, Read a Record into fielded variables, Read single or multiple lines and Trim spaces from the trailing end of fielded variables.

Another powerful disk function not to be overlooked is the "LIBRARY" command that allows you to include the entire contents of a file in your text. This can be very useful for a great many applications. You can use a Library command to automatically include a standard or optional printer setup command file, or to include standard paragraphs, headers or information created from a spread sheet or any other program. And, for printing very large documents that consist of several files linked together.

Autoexec Startup Files

TEXTPRO IV will automatically load and execute a command text file when it first executes. This allows you to customize the program configuration for your system and printer whenever you startup TEXTPRO IV. You can setup the screen display format, colors, adjust automatic key repeat, printer baud rate, load a set of function keys, load your printers control codes and more.

80 Programmable Function Keys

TEXTPRO IV allows you to have up to 80 function keys with just about any kind of information or command sequences you can imagine. Once programmed, you can have a command sequence execute using a single function key. You can also Save and Load function key sets at any time. So, you can have several sets for different writing tasks or projects, the possibilities are endless. Just think, with a single function key you could, load a disk file, search for and replace all the occurances of a phrase, save the file back to disk, have it processed and printed!

Text Editing

TEXTPRO IV has a powerful, full featured, line oriented screen editor that is faster and more efficient then most editors you've ever worked with. It supports single or multiple line copy and move, global or local search and replace, word and character insert/delete, block delete and much more. It features adjustable automatic key repeat, selectable display foreground and background colors, screen line width and more.

TEXTPRO IV uses fully compatible ASCII formatted files. You can even direct formatted output files to a standard ASCII disk file. It will Load, Save, Append, Kill, Text Process files from disk, Roll part of a file to disk, Get next portion of a file, display a Directory and Backup Ramdisk to & from Floppy disks.

TEXTPRO IV's files are also compatible with spelling checker programs like Spell 'n Fix from Star Kits, a shareware program, available with TEXTPRO IV for your evaluation, just for the asking.

Fully Buffered Keyboard

While many word processing programs are slow and often lose keystrokes. TEXTPRO IV has a fully buffered keyboard that is virtually impossible to out type. Even when it's busy, it will still remember the keystrokes entered. You can enter in commands or whatever, even during insert mode you'll never lose a key.

Professional Word Processing Power

TEXTPRO IV is a powerful tool for both the Casual and Professional Word Processing user. It offers a wide range of features and functions that can satisfy even the most demanding writer. Even though you may not need all of TEXTPRO IV's power and flexability right now, its not a program that you can easily outgrow. As your needs and skills improve, you'll discover that you won't need to go out and buy another word processing program, TEXTPRO IV will already be ready and waiting. No Text Processing program available for the Color Computer III gives you more Text Processing Power than TEXTPRO IV. It can make your writing appear more professional than you ever thought possible. Check around, see what other word processing programs have to offer in terms of power, speed and flexability. When your finished comparing them against TEXTPRO IV, you'll see that it's the only real choice for the Color Computer III.

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Contributions to THE RAINBOW are welcome from everyone. We like to run a variety of programs that are useful/helpful/fun for other CoCo owners.

WHAT TO WRITE: We are interested in what you may wish to tell our readers. We accept for consideration anything that is well-written and has a practical application for the Tandy Color Computer. If it interests you, it will probably interest lots of others. However, we vastly prefer articles with accompanying programs which can be entered and run. The more unique the idea, the more the appeal. We have a continuing need for short articles with short listings. These are especially appealing to our many beginners.

FORMAT: Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs and debug our typing errors. All programs should be supported by some editorial commentary explaining how the program works. We also prefer that editorial copy be included on the tape or disk using any of the word processors currently available for the Color Computer. Also, please include a double-spaced printout of your editorial material and program listing. Do not send text in all capital letters; use upper- and lowercase.

COMPENSATION: We do pay for submissions, based on a number of criteria. Those wishing remuneration should *so state* when making submissions.

For the benefit of those who wish more detailed information on making submissions, please send a self-addressed, stamped envelope (SASE) to: Submission Guidelines, THE RAINBOW, The Falsoft Building, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

Please do not submit material currently submitted to another publication.

acute with BBS programs and others that call in a number of subroutines.

In a recent conversation, Kevin Darling and I wondered why neither of us had thought of the technique that can eliminate most of your problems. It had been right there in the manual all the time — it's a good thing it wasn't a snake. Even though the subroutines like to stick around, there is a way to get rid of them. Use the command `kill` to unlink a procedure from your `RunB` space — or your BASIC09 space. Here's some sample code:

```
RUN GFX2("clear")
KILL "GFX2"
```

or

```
sub$="gfx2"
RUN sub$
KILL sub$
```

Another question that keeps popping up concerns the C compiler and the fact that the authors hard-coded it to look for the library files on a drive named `/D1`. To solve the problem, patch `CC1` and `C.PREP` with `Modpatch`, shown in Figure 2.

Also on the C front, Greg Law points out that you must use the new assembler and linker supplied with the Development System when you use the new libraries that come with *Multi-Vue*. The new libraries are stored in a slightly different format that the old linker doesn't recognize. To use the new assembler and linker, delete `c.asm` and `c.link` from your compiler disk, rename `rma` to `c.asm`, and rename `rlink` to `c.link`. Then you can use either the old or new library formats without any trouble.

And while we're handing out tips, Mike Washburn has contributed this one for *Home Publisher* users trying to use a Gemini 10X with the Epson driver. Mike reports he had luck with the following patch. The Hi-Res command, `Esc Z`, should be changed to `Esc z`. The procedure script is shown in Figure 3. After you start *Home Publisher*, set baud rate, no line feeds, and select the Gemini Driver. Thanks, Mike.

```
* MODULE:   cc1

* PROBLEM:  Hard coded for /D1

* SPECIFIC: Change the /D1 string to /DD

*

modpatch

L CC1

C 0EE6 31 44

V



* MODULE:   c.prep

* PROBLEM:  Hard coded for /D0

* SPECIFIC: Change the /D0 string to read /DD instead

*

modpatch

L C.Prep

C 135D 31 44

V
```

Figure 2: `Modpatch`

```
BUILD epson.p

L prn.EpsRX80

C 0049 5A 7A * Z -> z

V

<ENTER>

LOAD  /Dx/CMDS/prn.EpsonRX

MODPATCH  epson.p

SAVE  /Dx/CMDS/prn.Gemini  prn.EpsRX80

ATTR  /Dx/CMDS/prn.Gemini  pe  e

PUBLISH [opts]
```

Figure 3

Listing 1: `DefsDemo`

```
PROCEDURE DefsDemo
 0000       (* First lets define a data type we can use to create a device window
 0045
 0046       TYPE DW=action:INTEGER; sty,cpx,cpy,szx,szy,fprn,bprn,bdprn

             :BYTE
 0073
 0074       (* Now we need to reserve room in memory for our data
 00A9
 00AA       DIM path:BYTE
 00B1       DIM MakeDW:DW
 00BA
 00BB       (* The next statement opens a path to a window.
 00EA       (* You must make sure that window does not already exist.
 0123       (* you can do this by typing "deiniz W12" at the Basic09 prompt.
 0163
 0164       OPEN #path,"/W12":WRITE
 0173
 0174       (* Now we must initialize the data in our new structure.
 01AC
 01AD       MakeDW.action:=$1B20
 01B9       MakeDW.sty=2
 01C4       MakeDW.cpx=0
 01CF       MakeDW.cpy=0
 01DA       MakeDW.szx=20
 01E5       MakeDW.szy=12
 01F0       MakeDW.fprn=0
 01FB       MakeDW.bprn=2
 0206       MakeDW.bdprn=1
 0211
 0212       (* Once we have initialized the data we can put the structure
 024F       (* out on the path we created earlier.
 0275
 0276       PUT #path,MakeDW
 0280
 0281       (* In order to see the new window, we must "select" it.
 02B8
 02B9       RUN gfx2(path,"select")
 02CC       PRINT #path,"Hello OS-9 Level II Fans"
 02ED       FOR x:=1 TO 10000 \NEXT x
 030B
 030C       (* After we have displayed our new window for a few seconds we must
 034F       (* tell Basic09 that we want to return to our original window or the
 0393       (* program will lock in the new window.  There is no way for it to
 03D5       (* get any information from the keyboard while the new window is.
 0416       (* selected.
 0422
 0423       RUN gfx2(1,"select")
 0434       END
```

A Short Listing

We have included a short listing this month to get you thinking again about data structures in BASIC09 (see Listing 1). We define a new data type for a device window and then show you how you can put it out to a path when you want to open a new window. It's a warm-up for a closer look at *Multi-Vue* and at some of the techniques you will need to write applications using the window manager, `WindInt`. Hopefully, we'll be able to translate several of the C data structures introduced in the *Multi-Vue* manual into BASIC09 data types and show you how you can use them to your advantage.

> ***"A ballot printed on Page 11 of* MOTD *gives you a chance to vote for a new slate of officers."***

Another Handy Goldberg Utility

Steve Goldberg, 695 Plainview Road, Bethpage, NY, who sells the fantastic OS-9 utility package *Utilipak Plus* at approximately $2 per utility, is back again this month with a program called `Cmdgen`. It generates OS-9 modules that execute existing programs — or a series of programs — from a short command line. For example:

```
OS9: cmdgen write ENTER
>chd /d1/letters ; edit *
; list * >/p ENTER
```

The keystrokes above will generate a module called `Write`. When you want to write and print a letter, you need only type `write`, followed by the filename you want to use to store the letter. Goldberg suggests that you should use full pathlists when you generate `Cmdgen` modules, as they may be executed from any directory on your computer. If you forget the commands you put in a `Cmdgen` module, you can generate a reminder by typing `os9: cmdgen filename` ENTER.

Enjoy `Cmdgen`, and we'll join you in June for more OS-9 tips and tricks. ☐

T & D SUBSCRIPTION SOFTWARE CONTINUES ITS

ISSUE #1, JULY 1982
COVER 1
RACETRACK
HANGMAN
MUSIC ALBUM
LIFE EXPECTANCY
WORD TESTS
KILLER MANSION
BARTENDER
CALENDAR
ROBOT WAR

ISSUE #2, AUGUST 1982
UFO COVER PT. 1
BIORHYTHM
BOMBARDMENT
BLACK JACK
COST OF LIVING
FRENZY
BUSINESS LETTER
QUICK THINK
QUEST INSTRUCTIONS
QUEST FOR LENORE

ISSUE #3, SEPTEMBER 1982
UFO COVER PT. 2
BASKETBALL
CHUCKLUCK
SLOT MACHINE
ALPHABETIZER
NFL PREDICTIONS
FLAG CAPTURE
ROBOT BOMBER

ISSUE #4, OCTOBER 1982
UFO RESCUE
TANK BATTLE
DRIVEWAY
SOUNDS
BALLOON DROP
MIND BOGGLE
COCO-TERRESTRIAL ADV.
CALORIE COUNTER
JACK-O-LANTERN

ISSUE #5, NOVEMBER 1982
CATALOG COVER
BOWLING
PROGRAM INVENTORY
PROMISSORY-LOANS
CHECKBOOK BALANCER
TRIGONOMETRY TUTOR
CONVOY
BAG-IT
SPECTRA SOUND
CONVEYOR BELT

ISSUE #6, DECEMBER 1982
CHRISTMAS COVER
RAINDROPS
STOCK MARKET
ADVANCED PONG
DESTROY
SOUND ANALYZER
CREATIVITY TEST
VOICE DATA
ML TUTORIAL PT. 1
LOONY LANDER

ISSUE #7, JANUARY 1983
NEW YEARS COVER
LIST ENHANCER
SUPER PRECISION DIV.
BOMB DIFFUSE
SPACE STATION
ML TUTORIAL PT. 2
SHOOT OUT
FIND UTILITY
CYRORG INS.
CYBORG FACES

ISSUE #8, FEBRUARY 1983
COVER 8
DEFEND
3 DIMENSIONAL MAZE
COCO CONCENTRATION
AUTO LINE NUMBERING
ML TUTORIAL PT. 3A
ML TUTORIAL PT. 3B
NUCLEAR POWER PLANT
DUAL BARRIER
BRICKS

ISSUE #9, MARCH 1983
TIME MACHINE COVER
TRIG DEMO
PYRAMID OF CHEOPS
PROGRAM PACKER
BUDGET
ELECTRONIC DATEBOOK
ML TUTORIAL PT. 4
TAPE DIRECTORY
BLOCK-STIR
COCO ADDING MACHINE

ISSUE #10, APRIL 1983
TENTH COVER
PYRAMID OF DANGER
TYPING TUTOR
ML TUTORIAL PT. 5
TINYCALC
STOCK MARKET COMP
YAH-HOO
MISSILE ATTACK
SCREEN PRINT
BRIKPONG

ISSUE #11, MAY 1983
ELEVENTH COVER
ARCHERY
FROG JUMP
ML TUTORIAL PT. 6
MLT DICTIONARY
BASIC SPEED UP TOT.
METRIC CONVERTOR
GRAPHIC QUAD ANTENNA
GRAPHICS PROGRAM
CATERPILLAR CAVE

ISSUE #12, JUNE 1983
TWELFTH COVER
SHOOTING GALLERY
BOMB STOPPER
VALLEY BOMBER
STARFIGHTER
WHEEL OF FORTUNE
ML TUTORIAL PT. 7
MERGE UTILITY
RAM TEST
LANDER

ISSUE #13, JULY 1983
THIRTEENTH COVER
FLASH CARD
ICE BLOCK
COSMIC FORTRESS
MAIL LIST
DOLLARS & CENTS
ML TUTORIAL PT. 8
SDSK COPY
MUSIC SYNTHESIZER
CRAWLER

ISSUE #14, AUGUST 1983
MYSTERY COVER
ROW BOAT
COMPUTER TUTL PT. 1
INDEX DATABASE
DISK ZAPPER
COCO-MONITOR
COCO-ARTIST
ROBOT COMMAND
TEST SCREEN PRINT
HIGH RESOLUTION TEXT

ISSUE #15, SEPTEMBER 1983
MYSTERY COVER PT. 2
GOLD VALUES
TREK INSTRUCTIONS
TREK
HIGH TEXT MODIFICATION
ASTRO DODGE
DR. COCO
PEG JUMP
MORSE CODE
PURGE UTILITY

ISSUE #16, OCTOBER 1983
MYSTERY COVER
BOPOTRON
DIRECTORY RECALL
VECTOR GRAPHICS INST.
VECTOR GRAPHICS
SKYDIVER
SWERVE AND DODGE
NIMBO BATTLE
TAPE ANALYSIS UTILITY
LIFE GENERATIONS

ISSUE #17, NOVEMBER 1983
THANKSGIVING COVER
3-D TIC-TAC-TOE
INDY 500
COLLEGE ADVENTURE
MEMORY GAME
DUNGEON MASTER
WEATHER FORECASTER
GRID FACTOR INST.
GRID FACTOR
DRAW

ISSUE #18, DECEMBER 1983
CHRISTMAS COVER
CLIMBER
GALACTIC CONQUEST
WARLORDS
STATES REVIEW
MATH TUTOR
MACHINE LANGUAGE DATA
PRINTER UTILITY INST.
PRINTER UTILITY
MUTANT WAFFLES

ISSUE #19, JANUARY 1984
BANNER
PROBE
DISK DIRECTORY PROTECTOR
OPTICAL CONFUSION
WORD PROCESSOR
WORD SEARCH
ASTRONAUT RESCUE
STAR TRAP
PIE CHART
FORCE FIELD

ISSUE #20, FEBRUARY 1984
INTRODUCTION:
HINTS FOR YOUR COCO
ESCAPE ADVENTURE
SEEKERS
MASTER BRAIN
LIST CONTROLLER
DISKETTE CERTIFIER
ROM COPY
BASIC RAM
SNAFUS

ISSUE #21, MARCH 1984
BASIC CONVERSIONS
FINANCIAL ADVISE
CASTLE STORM
DOS HEAD CLEANER
COCO TERMINAL
SNAKE CRAWLER
WAR CASTLE
SKY FIRE
EASY BASIC
DOTS 3-D

ISSUE #22, APRIL 1984
HEALTH HINTS
GLIBLIBS
CLOTHER SLITHER
BIBLE 1 & 2
BIBLE 3 & 4
CATCH ALL
INVADER
ALIEN RAID
MOON ROVER
10 ERROR IGNORER

ISSUE #23, MAY 1984
MONEY SAVERS 1 & 2
STOCKS OR BOMBS
WALL AROUND
COCO TECHNICAL LOOK PT. 1
NUCLEAR WAR INST.
THERMONUCLEAR WAR
CIRCUIT DRAWER
MOUSE RACES
SUPER-SQUEEZE
DATA FALL

ISSUE #24, JUNE 1984
DIR PACK & SORT
BRICK OUT
COCO TECHNICAL LOOK PT. 2
USA SLIDE PUZZLE
51 *24 SCREEN EDITOR
51 *24 SCREEN
CITY INVADERS
PRINTER SPOOLER
STEPS
SNAKE

ISSUE #25, JULY 1984
CLOCK
COCO TECHNICAL LOOK PT. 3
SKID ROW ADVENTURE
MONEY MAKER
PIN-HEAD CLEANING
LINE EDITOR INST.
LINE EDITOR
BOOMERANG
BUBBLE BUSTER
RECOCHET

ISSUE #26, AUGUST 1984
PEEK, POLE & EXECUTE
SAUCER RESCUE
YOUNG TYPER TUTOR
O-TEL-O
OLYMPIC EVENTS
DOUBLE DICE
COCO DATABASE
BATTLE STAR
COCO-PIN BALL
MONTEZUMAS DUNGEONS

ISSUE #27, SEPTEMBER 198
COCO TO COM 64
GALACTIC SMUGGLER
INDY RACE
ACCOUNT MANAGER
CASSETTE MERGE UTILITY
STRING PACKING TUTORIAL
SPACE DUEL
BUGS
TRAP-BALL
BALLOON FIRE

ISSUE #28, OCTOBER 1984
HANGING TREE
CHECKERS
FOOTBALL +
MORE PEEKS, POKES
SPELLING CHECKER
SOUND DEVELOPMENT
WORD GAME
SCREEN REVERSE
AUTO COPY
RAT ATTACK

ISSUE #29, NOVEMBER 1984
DISK ROLL OUT
ROBOT ON
MULTIPONG
ADVENTURE GENERATOR
QUEST ADVENTURE
QUARTER BOUNCE
DUAL OUTPUT
KEY REPEAT
FULL EDITOR
METEOR

ISSUE #30, DECEMBER 1984
MATH HELP
ZECTOR ADVENTURE
WORLD CONQUEST
DRAG RACE
MINE FIELD
T-NOTES TUTORIAL
T & D PROGRAM INDEXER
SYSTEM STATUS
ERROR TRAP
DROLL ATTACK

ISSUE #31, JANUARY 1985
TREASURES OF BARSOOM
BATTLE GROUND
STRUCTURED COMPILED LANGU
LIBRARY MODULE
MINIATURE GOLF
STAR DUEL
ARITHMETIC FOOTBALL
GRID RUN
SPIRAL ATTACK
FAST SORT
MUNCHMAN

ISSUE #32, FEBRUARY 1985
DR. SIGMUND
ICE WORLD ADVENTURE
LOTTERY ANALYST
BASIC COMPILER
MUSIC CREATOR
MEANIE PATROL
TRI-COLOR CARDS
SHAPE RECOGNITION
DISK BACKUP
SPACE PROTECTOR

ISSUE #33, MARCH 1985
LIGHT CYCLE
PAINT
SKEET SHOOTING
GUITAR NOTES
ML DISK ANALYZER
PERSONAL DIRECTORY
NAUGHA ADVENTURE
EGGS GAME
DISK DIRECTORY PRINT
SPEED KEY

ISSUE #34, APRIL 1985
HOVER TANK
POWER SWORD
TERMITE INVASION
SPELLING CHECKER
DOS BOSS
NINE CARD CHOICE
MUSIC GENERATOR
FYR-DRACA
DRIVE TEST
GRAPHIC TOUR

ISSUE #35, MAY 1985
SELECT A GAME 1
TAPE PROBLEMS
STROLL TRIVIA
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- SPACE LAB
- AUTO COMMAND
- COMPUTER MATCHMAKER
- KNIGHT AND THE LABYRINTH
- STAR SIEGE
- TALKING SPELLING QUIZ

ISSUE #37, JULY 1985
- CHESS MASTER
- BIBLE 5–7
- SHIP WREK ADVENTURE
- FILE TRANSFER
- FOUR IN A ROW
- MARSHY
- TAPE CONTROLLER
- CATACOMB
- AUTO TALK
- SGR8PAK

ISSUE #38, AUGUST 1985
- GOLF PAR 3
- WIZARD ADVENTURE
- KITE DESIGN
- ROBOTS
- GOMOKU
- AMULET OF POWER
- LINE COPY UTILITY
- DISK PLUMBER
- SUPER RAM CHECKER
- GRAPHIC HORSE RACE

ISSUE #39, SEPTEMBER 1985
- DRUNK DRIVING
- CAR MANAGER
- SQUEEZE PLAY
- SUPER BACKUP
- RECIPE MACHINE
- ANTI-AIRCRAFT
- UNREASON ADVENTURE
- TALKING ALPHABET
- SUPER VADERS
- AUTOMATIC EDITOR

ISSUE #40, OCTOBER 1985
- STAR TREK
- HAM RADIO LOG
- COCO-WAR
- DISK LABELER
- SHIP WAR
- ELECTRIC COST
- MULTIKEY BUFFER
- NUKE AVENGER
- CURSOR KING
- SAND ROVER

ISSUE #41, NOVEMBER 1985
- GRUMPS
- DISK DRIVE SPEED TEST
- SOLAR CONQUEST
- GAS COST
- RIME WORLD MISSION
- WUMPUS
- CHARACTER EDITOR
- GRAPHIC TEST
- GRAPHIC LOOPY
- BOLD PRINT

ISSUE #42, DECEMBER 1985
- HOME PRODUCT EVALUATION
- YAHTZEE
- DISK UTILITY
- MACH II
- ELECTRONIC BILLBOARD
- CAR CHASE
- SUPER MANSION ADVENTURE
- SLOT MACHINE GIVE AWAY
- TEXT BUFFER
- TUNNEL RUN

ISSUE #43, JANUARY 1986
- DUELING CANNONS
- WATER COST
- ZIGMA EXPERIMENT
- MUSICAL CHORDS
- SAFE PASSAGE
- PASSWORD SCRAMBLER
- GUNFIGHT
- KEYPAD ENTRY
- STYX GAME
- PRINTER DIVERT

ISSUE #44, FEBRUARY 1986
- HOME INVENTORY
- NINE BALL
- PRINTER REVIEW
- EXPLORER ADVENTURE
- SPANISH LESSONS
- CROSS FIRE
- RAM SAVER
- GRAY LADY
- JOYSTICK INPUT
- COSMIC SWEEPER

ISSUE #45, MARCH 1986
- INCOME PROPERTY MGMT.
- ELECTRONIC BILLBOARD 2
- MOUNTAIN BATTLE
- THE FIGHT
- COLO KEENO
- HOCKEY
- LOGICAL PATTERNS
- ON SCALE SCREEN
- LIBERTY SHIP
- SINGLE STEP RUN

ISSUE #46, APRIL 1986
- SPECIAL EVENTS REMINDER
- DISK LOCK
- SMALL BUSINESS MANAGER
- BOMB RUN
- TANKS
- TAR PITS
- BASEBALL
- NUMBER RELATIONSHIPS
- ROULETTE
- GLOBAL EDITOR

ISSUE #47, MAY 1986
- CHRISTMAS LIST
- BLACK HOLE
- PITCHING MANAGER
- SYMBOLIC DIFF.
- BUG SPRAY
- OWARE CAPTURE
- EASY GRAPHICS
- DESERT JOURNEY
- SCREEN CONTROL
- FULL ERROR MESSAGE

ISSUE #48, JUNE 1986
- CHESTER
- TV SCHEDULE
- BASE RACE
- ROMAN NUMERALS
- ASTRO DODGE
- HIRED AND FIRED
- MULTI COPY
- AUTO MATE
- SCROLL PROTECT
- NOISE GENERATOR

ISSUE #49, JULY 1986
- COMPUTER I.O.U.
- DISK DISASSEMBLER
- BAKCHEK
- PACHINKO
- STOCK CHARTING
- HAUNTED STAIRCASE
- CANYON BOMBERS
- DRAGONS 1 & 2
- GRAPHIC SCROLL ROUTINE
- AUTO BORDER

ISSUE #50, AUGUST 1986
- BUSINESS INVENTORY
- D & D ARENA
- DISK CLERK
- PC SURVEY
- TREASURE HUNT
- SCREEN GENERATOR
- ASTRO SMASH
- NFL SCORES
- BARN STORMING
- SMASH GAME

ISSUE #51, SEPTEMBER 1986
- ASSET MANAGER
- MONEY CHASE
- FISHING CONTEST
- RIP OFF
- HAND OFF
- BUDGET 51
- VAN GAR
- DOS EMULATOR
- MEM DISK
- VARIABLE REFERENCE

ISSUE #52, OCTOBER 1986
- ACCOUNTS RECEIVABLE
- WORKMATE SERIES
- CALENDAR
- INVASION
- THE TRIP ADVENTURE
- FOOT RACE
- FLIPPY THE SEAL
- SCREEN CALCULATOR
- ABLE BUILDERS
- SUPER ERROR 2

ISSUE #53, NOVEMBER 1986
- CORE KILL
- LUCKY MONEY
- COOKIES ADVENTURE
- NICE LIST
- SPANISH QUIZZES
- PAINT EDITOR
- CAVERN CRUISER
- SNAP SHOT
- MEGA RACE
- KICK GUY

ISSUE #54, DECEMBER 1986
- JOB LOG
- PEGS
- DIGITAL SAMPLING
- JUNGLE ADVENTURE
- PAINT COCO 3
- CONVERT 3
- COMPUTER TYPE
- PANZER TANKS
- MRS PAC
- BIG NUM

ISSUE #55, JANUARY 1987
- GRADE BOOK
- MAIL LIST
- DOWN HILL
- FIRE FOX
- JETS CONTROL
- GALLOWS
- DIR MANAGER
- FIRE RUNNER
- GRAPHICS BORDER
- COSMIC RAYS

ISSUE #56, FEBRUARY 1987
- CALENDAR PRINT
- CRUSH
- GALACTA
- OCEAN DIVER
- CLUE SUSPECT
- WORD EDITOR
- ALIEN HUNT
- DEMON'S CASTLE
- PICTURE DRAW
- DIG

ISSUE #57, MARCH 1987
- THE BAKERY
- ENCHANTED VALLEY ADV.
- SAFE KEEPER
- WAR 1
- BOMB DISABLE
- PIANO PLAYER
- SPREAD SHEET
- SLOT MANEUVER
- LIVING MAZE
- GEM SEARCH

ISSUE #58, APRIL 1987
- ACCOUNTS PAYABLE
- PRINTER GRAPHICS
- SIMON
- PANELING HELPER
- MULTI CAKES
- CAR RACE
- ELECTRONICS I
- BATTLE TANK
- DISKETTE VERIFY
- WEIRDO

ISSUE #59, MAY 1987
- GENEOLOGY
- HOME PLANT SELECTION
- CHECK WRITER
- HELIRESCUE
- KABOOM
- NEW PONG
- CROQUET
- FUNCTION KEYS
- ZOOM
- ELECTRONICS 2

ISSUE #60, JUNE 1987
- JOB COSTING
- LABELS
- CATCH A CAKE
- COCO MATCH
- ROBOTS
- STREET RACERS
- BOWLING 3
- ELECTRONICS 3
- GRAFIX
- KRON

ISSUE #61, JULY 1987
- EZ ORDER
- SUBMISSION WRITER
- KEYS ADVENTURE
- WALLPAPER
- CHOPPER COMMAND
- UNDERSTANDING OPPOSITES
- BIT CODE PLOTTING
- ELECTRONICS IV
- KING PEDE
- RAIDER

ISSUE #62, AUGUST 1987
- PENSION MANAGEMENT
- HERB GROWING
- CATALOGER UTILITY
- RAIDERS
- ALPHABETIZING
- W.F.O.
- ELECTRONICS V
- RAMBO ADVENTURE
- BLOCKS
- MULTI SCREEN CAVES

ISSUE #63, SEPTEMBER 1987
- GENEOLOGIST HELPER
- SMART COPY
- MAINTENANCE REPORTING
- COCO 3-COCO 2 HELPER
- DIRECTORY PICTURE
- SUB STTACK
- SAVE THE MAIDEN
- CAVIATOR
- ELECTRONICS VI
- MONKEY SHINE

ISSUE #64, OCTOBER 1987
- GARDEN PLANTS
- FORT KNOX
- ELECTRONICS FORMULAS
- SNAKE IN THE GRASS
- CYCLE JUMP
- GEOMETRY TUTOR
- WIZARD
- GAME OF LIFE
- ELECTRONICS VII
- FLIGHT SIMULATOR

ISSUE #65, NOVEMBER 1987
- TAXMAN
- DAISY WHEEL PICTURES
- SIR EGGBERT
- CROWN QUEST
- GYM KHANA
- COCO 3 DRAWER
- FOOTBALL
- ELECTRONICS 8
- CHOP

ISSUE #66, DECEMBER 1987
- ONE ROOM ADVENTURE
- OS9 TUTORIAL
- RIVER CAPTAIN
- SOUND EFFECTS
- BETTING POOL
- ADVANCE
- MATH TABLES
- ELECTRONICS 9
- LOWER TO UPPER
- NOIDS

ISSUE #67, JANUARY 1988
- AUDIO LIBRARY
- SAVE THE EARTH
- WEIGHTS AND MEASURES
- LOW RES PICTURES
- WORD COUNTER
- BACARAT
- BATTLE SHIP
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4	12	20	28	36	44	52	60	
5	13	21	29	37	45	53	61	
6	14	22	30	38	46	54	62	
7	15	23	31	39	47	55	63	
8	16	24	32	40	48	56	64	

PLEASE CIRCLE
TAPE or DISK

Listing 2: Cmdgen

```
****************************************************
*
* CMDGEN  -  (c) 1987 by STEPHEN B. GOLDBERG
*
* Creates OS-9 modules which can execute the indicated
* program or series of programs, with parameter passing.
* A command line is entered at the '>' prompt.  It also
* displays commands contained in the generated modules.
*
* Use: cmdgen <command.name>
*
         ifpl
         use   /d0/defs/os9defs
         endc
*
         mod   len,name,prgrm+objct,reent+1,entry,dsiz
*
pointer  rmb   2   parameter pointer
modstart rmb   2   start of module
modlen   rmb   11   module length (actual)
modname  rmb   34   module name
ident    rmb   77   cmdgen signature 'DG'
cmdline  rmb   153   command line and CRC
maxsize  equ   .-modstart   maximum module length
         rmb   200   stack
         rmb   200   param
dsiz     equ   .
*
name     fcs   /cmdgen/
         fcb   1   edition number
         fcc   /(c)1987 S.B.Goldberg/
**************************************************
* BEGINNING OF DUMMY MODULE                      *
**************************************************
dummy    fdb   34765,0,13,4481,0,13058,23041     *
         fdb   257,257,257,257,257,257,257,257   *
         fdb   257,257,257,257,257,257           *
         fcc   /BY CMDGEN/                       *
******************************                   *
* TRANSFER CMD. LINE TO BUFFER                   *
******************************                   *
         leas  200,u   stack to direct page      *
         stx   <200   save variable pointer      *
         leax  commands,pcr   command line       *
         leay  202,u   command buffer            *
tfrloop  lda   ,x+   cmd. line character         *
         cmpa  #$0d   end of line?               *
         beq   execute   yes, execute commands   *
         cmpa  #'*   wants variable?             *
         beq   setvar   yes, variable to buffer  *
         sta   ,y+   no, character to buffer     *
         bra   tfrloop   do again                *
******************************                   *
* INCLUDE VARIABLE IN CMD. LINE                  *
******************************                   *
setvar   pshs  x   save cmd. line pointer        *
         ldx   <200   variable address           *
varloop  lda   ,x+   variable character          *
         cmpa  #$0d   end of variable?           *
         bne   saveit   no, put in buffer        *
         puls  x   get cmd. line pointer         *
         bra   tfrloop   back to transfer        *
saveit   sta   ,y+   save in buffer              *
         bra   varloop   get next var. character *
******************************                   *
* EXECUTE COMMAND LINE                           *
******************************                   *
execute  sta   ,y   terminate commands           *
         leax  <shell,pcr   shell                *
         ldy   #200   maximum cmd. length        *
         ldd   #$0001   type, lang., data size   *
         leau  202,u   commands address          *
         os9   f$chain   chain Shell             *
         os9   f$exit   exit with error          *
shell    fcs   /shell/                           *
commands equ   *   address of commands           *
dumlen   equ   *-dummy   length of dummy module  *
**************************************************
* END OF DUMMY MODULE                            *
**************************************************
* DISPLAY COMMAND LINE
******************************
display  leax  modstart,u   module buffer
         ldy   #maxsize   maximum module length
         os9   i$read   get module
         bcs   passerr   exit with error
         ldd   ident   get signature bytes
         cmpd  #$4447   cmdgen signature (DG)?
         bne   other   no, quit with prompt
         leax  cmdline,u   commands address
         lda   #1   standard output path
         bra   cmdout   display commands
******************************
* CMDGEN ERROR PROMPTS
******************************
noname   leax  <syntax,pcr   prompt address
errout   lda   #2   standard error path
cmdout   ldy   #150   maximum length
         os9   i$writln   to screen
passerr  bcs   enderr   exit with error
         lbra  noerr   quit
other    leax  <nocmdgen,pcr   prompt address
         bra   errout   prompt to screen and quit
*
syntax   fcc   /Use: cmdgen <command.name>/
         fdb   $070d
nocmdgen fcc   /**** Not a CMDGEN module!/
         fdb   $070d
prompt   fcc   /> /
******************************
* CREATE NEW MODULE
******************************
entry    decb   parameter?
         beq   noname   no, quit with prompt
         stx   pointer   command name pointer
         lda   #read.+exec.   mode
         os9   i$open   open file, if exists
         bcc   display   if yes, display commands
         leax  dummy,pcr   start of dummy module
         leay  modstart,u   start of module buffer
         ldb   #dumlen   length of dummy module
dumloop  lda   ,x+   get byte
         sta   ,y+   put in buffer
         decb   done?
```

One-Liner Contest Winner . . .

You're locked in a high-speed car hurtling through the canyons of doom — can you safely make it through? Use the right and left arrow keys to steer.

The listing:

```
0 CLS:P=234:V=11:FORW=5TO1STEP-1
:FORN=1TOP:V=V+(RND(3)-2)*((V<>1
)*(V<>(30-W))):PRINT@480,STRING$
(V,128)STRING$(W,32)STRING$(31-V
-W,128):P=P-(PEEK(344)=247)+(PEE
K(343)=247):IFPEEK(P+1024)<>128T
HENPRINT@P,"V";:NEXTN,W:PRINT"YO
U WIN!"ELSEPRINT"CRASH!"
```

Robert M. Dickau
Sacramento, CA

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape.*)

```
         bne   dumloop   no, move another byte
         leax  <prompt,pcr   command line prompt
         lda   #1   standard output path
         ldy   #2   two characters
         bsr   write   to screen
         clra   standard input path
         leax  cmdline,u   command line buffer
         ldy   #150   maximum line length
         os9   i$readln   get command line
enderr   bcs   out   exit with error
         cmpy  #1   any entry?
         beq   noerr   no, quit without error
         leay  3+dumlen,y   command line + dummy + CRC
         sty   modlen   put length in module header
         leax  modstart,u   start of module
         ldb   #7   parity counter
         lda   ,x+   get byte
eorloop  eora  ,x+   exclusive OR with next byte
         decb   done?
         bne   eorloop   no, do again
         coma   yes, complement
         sta   ,x   save in parity byte
         ldx   pointer   command name
         leay  modname,u   module name buffer
nameloop ldd   ,x+   get name characters
         sta   ,y+   put character in module
         cmpb  #$20   done?
         bhi   nameloop   no, move next character
         ora   #%10000000   yes, set ms bit
         sta   -1,y   return as last character
         leax  modstart,u   address of module
         ldd   modlen   module length
```

```
         subd  #3   less CRC bytes
         tfr   d,y   length to Y register
         pshs  u   save U register
         leau  d,x   address of CRC accumulator
         ldd   #$ffff   initialize
         std   ,u   the CRC
         sta   2,u   accumulator
         os9   f$crc   do count
         bcs   out   exit with error
         com   ,u+   complement
         com   ,u+   the CRC
         com   ,u   bytes
         puls  u   reitieve U register
         ldx   pointer   command name
         ldd   #$062f   mode and attributes
         os9   i$create   create  module file
         bcs   out   exit with error
         leax  modstart,u   module address
         ldy   modlen   length of module
         bsr   write   module to disk file
noerr    clrb   clear error flag
out      os9   f$exit   quit
**********************************
* OUTPUT SUBROUTINE
**********************************
write    os9   i$write   write
         bcs   out   exit with error
         rts   return
*
         emod
len      equ   *
         end
```

Listing 3: Makecmdgen

```
PROCEDURE makecmdgen
 0000      DIM path,byt:BYTE
 000B      DIM count:INTEGER
 0012      CREATE #path,"/dd/cmds/cmdgen":WRITE
 002C      (* Level I use "/d0/cmds/cmdgen" *)
 004F      FOR count=1 TO 425
 0060        READ byt
 0065        PUT #path,byt
 006F      NEXT count
 007A      CLOSE #path
 0080      SHELL "attr /dd/cmds/cmdgen e pe"
 009D      (* Level I use "/d0/cmds/cmdgen e pe" *)
 00C5      END
 00C7      DATA 135,205,1,169,0,13,17,129,128,1,13,2,167,99,109
 00F8      DATA 100,103,101,238,1,40,99,41,49,57,56,55,32,83,46
 0129      DATA 66,46,71,111,108,100,98,101,114,103,135,205,0,0,0
 015A      DATA 13,17,129,0,0,51,2,90,1,1,1,1,1,1,1
 018B      DATA 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
 01BC      DATA 1,1,1,1,1,1,1,66,89,32,67,77,68,71,69
 01ED      DATA 78,50,201,0,200,159,200,48,141,0,63,49,201,0,202
 021E      DATA 166,128,129,13,39,26,129,42,39,4,167,160,32,242,52
 024F      DATA 16,158,200,166,128,129,13,38,4,53,16,32,228,167,160
 0280      DATA 32,242,167,164,48,140,17,16,142,0,200,204,0,1,51
 02B1      DATA 201,0,202,16,63,5,16,63,6,115,104,101,108,236,48
 02E2      DATA 66,16,142,1,21,16,63,137,37,27,220,49,16,131,68
 0313      DATA 71,38,24,48,200,126,134,1,32,5,48,140,19,134,2
 0344      DATA 16,142,0,150,16,63,140,37,114,22,0,205,48,140,30
 0375      DATA 32,237,85,115,101,58,32,99,109,100,103,101,110,32,60
 03A6      DATA 99,111,109,109,97,110,100,46,110,97,109,101,62,7,13
 03D7      DATA 42,42,42,42,32,78,111,116,32,97,32,67,77,68,71
 0408      DATA 69,78,32,109,111,100,117,108,101,33,7,13,62,32,90
 0439      DATA 39,174,159,0,134,5,16,63,132,36,139,48,141,255,11
 046A      DATA 49,66,198,124,166,128,167,160,90,38,249,48,140,224,134
 049B      DATA 1,16,142,0,2,141,109,79,48,200,126,16,142,0,150
 04CC      DATA 16,63,139,37,93,16,140,0,1,39,86,49,168,127,16
 04FD      DATA 159,4,48,66,198,7,166,128,168,128,90,38,251,67,167
 052E      DATA 132,158,0,49,79,236,128,167,160,193,32,34,248,138,128
 055F      DATA 167,63,48,66,220,4,131,0,3,31,2,52,64,51,139
 0590      DATA 204,255,255,237,196,167,66,16,63,23,37,26,99,192,99
 05C1      DATA 192,99,196,53,64,158,0,204,6,47,16,63,131,37,8
 05F2      DATA 48,66,16,158,4,141,4,95,16,63,6,16,63,138,37
 0623      DATA 248,57,39,122,123
```

One-Liner Contest Winner . . .

This shortie provides a chart of loan payments. Just enter the principal, number of months you'll be paying on the loan and the interest rate percentage, and the program produces a table of interest and principal payments. The screen displays only 12 months at a time, so press ENTER to see the next 12.

The listing:

```
3 CLS:INPUT"AMT,MNTHS,PCT";A,M,R
:R=R/1200:P=A/((1-(1/((1+R)^M)))
/R):PRINT@35,"BAL      PRIN    IN
T      PAY":FORN=1TOM:S=R*A:A=A-P
+S:PRINTUSING"#####.## ####.## #
###.## ####.##";A,P-S,S,P;:IFN=I
NT(N/12)*12THENINPUT">";A$:PRINT
@64,;:NEXT:ENDELSENEXT:END
```

Stuart Hawkinson
Aloha, OR

(For this winning one-liner contest entry, the author has been sent copies of both *The Third Rainbow Book of Adventures* and its companion *The Third Rainbow Adventures Tape*.)

Racksellers

The retail stores listed below carry THE RAINBOW on a regular basis and may have other products of interest to Tandy Color Computer users. We suggest you patronize those in your area.

ALABAMA

Birmingham	Jefferson News Co.
Brewton	McDowell Electronics
Florence	Anderson News Co.
Greenville	M & B Electronics
Madison	Madison Books
Montgomery	Trade 'N' Books
Tuscaloosa	Injun John's, Inc.

ALASKA

Fairbanks	Electronic World

ARIZONA

Cottonwood	A & W Graphics Co.
Lake Havasu City	Book Nook
Phoenix	TRI-TEK Computers
Sierra Vista	Livingston's Books
Tempe	Books, Etc.
	Computer Library
Tucson	Anderson News Co.

ARKANSAS

Fayetteville	Vaughn Electronics/Radio Shack
Ft. Smith	Hot Off the Press Newsstand
Little Rock	Anderson News Co.

CALIFORNIA

Berkeley	Lyon Enterprises
Citrus Heights	Software Plus
Grass Valley	Advance Radio, Inc.
Half Moon Bay	Strawflower Electronics
Hollywood	Levity Distributors
	Stef-Jen, Inc.
La Jolla	Butler & Mayes Booksellers
Los Angeles	Circus of Books (2 Locations)
Marysville	Bookland
Napa	Bookends Bookstore
Oakland	DeLauer's News Agency
Sacramento	Deibert's Readerama
	Tower Magazine
San Francisco	Booksmith
	Bookworks
	Castro Kiosk
Santa Monica	Midnight Special Bookstore
San Jose	Computer Literacy Bookshops
Santa Rosa	Sawyer's News, Inc.
Stockton	Harding Way News
	Paperbacks Unlimited
Sunnyvale	Computer Literacy
Torrance	El Camino College Bookstore

COLORADO

Aurora	Aurora Newsstand
Colorado Springs	Hathaway's
Denver	News Gallery
Glenwood Springs	The Book Train
Grand Junction	Readmore Book & Magazine
Longmont	City Newsstand

DELAWARE

Middletown	Delmar Co.
Newark	Newark Newsstand
Wilmington	Normar, Inc.—The Smoke Shop

DISTRICT OF COLUMBIA

Washington, DC	Chronichles
	News Room
	World News, Inc.

FLORIDA

Boca Raton	Great American Book Co.
Clearwater	The Avid Reader
Cocoa	The Open Door
Dania	Dania News & Books
Davie	Software Plus More
Ft. Lauderdale	Bob's News & Book-Store
	Clarks Out of Town News
	Mike's Electronics Distributor
Gainesville	Paper Chase
Jacksonville	Book Co.
North Miami Beach	Almar Bookstore
Panama City	Boyd-Ebert Corp.
Pensacola	Anderson News Co.
Pinellas Park	Wolf's Newsstand
South Pasadena	Poling Place Bookstore
Starke	Record Junction, Inc.
	Radio Shack Dealer

FLORIDA (cont'd)

Sunrise	Sunny's at Sunset
Tallahassee	Anderson News Co.
	DuBey's News Center
Titusville	Computrac

GEORGIA

Atlanta	Border's
Bremen	Bremen Electronics/Radio Shack
Forest Park	Ellers News Center
Jesup	Radio Shack
Thomasville	Smokehouse Newsstand
Toccoa	Martin Music Radio Shack

IDAHO

Boise	Book Shelf, Inc.
Moscow	Johnson News Agency

ILLINOIS

Belleville	Software or Systems
Champaign	Bookmark
Chicago	B. Dalton Booksellers
Decatur	Book Emporium
	K-Mart Plaza
	Northgate Mall
East Moline	Book Emporium
Evanston	Norris Center Bookstore
Kewanee	Book Emporium
Lisle	Book Nook
Lombard	Empire Periodicals
Newton	Bill's TV Radio Shack
Paris	Book Emporium
Peoria	Book Emporium
	Sheridan Village
	Westlake Shopping Center
	Illinois News Service
Springfield	Book Emporium
	Sangamon Center North
	Town & Country Shopping Ctr.
Sunnyland	Book Emporium
West Frankfort	Paper Place
Wheeling	North Shore Distributors

INDIANA

Angola	D & D Electronics
	Radio Shack
Berne	White Cottage Electronics
Bloomington	Book Corner
Columbus	Micro Computer Systems, Inc.
Crawfordsville	Koch's Books
Dyer	Miles Books
Franklin	Gallery Book Shop
Ft. Wayne	Michiana News Service
Garrett	Finn News Agency, Inc.
Indianapolis	Bookland, Inc.
	Borders Bookshop
	Delmar News
	Indiana News
	Southside News
Lebanon	Gallery Book Shop
Martinsville	Radio Shack
Wabash	Mitting's Electronics

IOWA

Davenport	Interstate Book Store
Des Moines	Thackery's Books, Inc.
Fairfield	Kramers Books & Gifts

KANSAS

Hutchinson	Crossroads, Inc.
Topeka	Palmer News, Inc.
	Town Crier of Topeka, Inc.
Wellington	Dandy's/Radio Shack Dealer
Wichita	Lloyd's Radio

KENTUCKY

Hazard	Daniel Boone Gulf Mart
Henderson	Matt's News & Gifts
Hopkinsville	Hobby Shop
Louisville	Hawley-Cooke Booksellers (2 Locations)
Paducah	Radio Shack

LOUISIANA

Baton Rouge	City News Stand
New Orleans	Sidney's News Stand Uptown
Monroe	The Book Rack

MAINE

Bangor	Magazines, Inc.
Brockton	Voyager Bookstore
Caribou	Radio Shack
Oxford	Books-N-Things
Sanford	Radio Shack

MARYLAND

College Park	University Bookstore

MASSACHUSETTS

Boston	Eastern Newsstand
Brockton	Voyager Bookstore
Cambridge	Out Of Town News
Ipswich	Ipswich News
Littleton	Computer Plus
Lynn	North Shore News Co.
Swansea	Newsbreak, Inc.

MICHIGAN

Allen Park	Book Nook, Inc.
Birmingham	Border's Book Shop
Durand	Robbins Electronics
E. Detroit	Merit Book Center
Harrison	Harrison Radio Shack
Hillsdale	Electronics Express/Radio Shack
Holland	Fris News Company
Lowell	Curt's Sound & Home Arcade Center
Muskegon	The Eight Bit Corner
Niles	Michiana News Service
Perry	Perry Computers
Riverview	Riverview Book Store
Roseville	New Horizons Book Shop

MINNESOTA

Burnsville	Shinder's Burnsville
Crystal	Shinder's Crystal Gallery
Edina	Shinder's Leisure Lane
Minneapolis	Shinder's (2 Locations)
Minnetonka	Shinder's Ridge Square
Roseville	Shinder's Roseville
St. Paul	Shinder's Annex
	Shinder's Maplewood
	Shinder's St. Pauls
Willmar	The Photo Shop

MISSOURI

Farmington	Ray's TV & Radio Shack
Flat River	Ray's TV & Radio Shack
Florissant	Book Brokers Unlimited
Jefferson City	Cowley Distributing
Kirksville	T&R Electronics
Moberly	Audio Hut
St. Louis	Book Emporium
St. Robert	Bailey's TV & Radio

MONTANA

Butte	Plaza Books

NEBRASKA

Lincoln	Nebraska Bookstore
Omaha	Nelson News

NEVADA

Carson City	Bookcellar
Las Vegas	Hurley Electronics
	Steve's Books & Magazines

NEW HAMPSHIRE

Keene	Radio Shack Associate Store
Manchester	Bookwrights
West Lebanon	Verham News Corp.

NEW JERSEY

Atlantic City	Atlantic City News Agency
Cedar Knolls	Village Computer & Software
Clinton	Micro World II
Pennsville	Dave's Elect. Radio Shack
Rockaway	Software Station

NEW MEXICO

Alamogordo	New Horizons Computer Systems
Albuquerque	Page One Newsstand
Santa Fe	Downtown Subscription

NEW YORK

Amherst	Village Green-Buffalo Books
Brockport	Lift Bridge Book Shop, Inc.
Brooklyn	Cromland, Inc.
Elmira Heights	Southern Tier News Co., Inc.
Fredonia	On Line: Computer Access Center
Hudson Falls	G.A. West & Co.
Huntington	Oscar's Bookshop
Johnson City	Unicorn Electronics
New York	Barnes & Noble—Sales Annex
	Coliseum Books
	Eastern Newsstand
	Grand Central Station, Track 37
	200 Park Ave., (Pan Am #1)
	55 Water Street
	World Trade Center #2
	First Stop News

NEW YORK (cont'd)	
	Idle Hours Bookstore
	International Smoke Shop
	Jonil Smoke
	Penn Book
	Software City
	State News
	Walden Books
	World Wide Media Services
Pawling	Universal Computer Service
Rochester	Village Green
	World Wide News
Woodhaven	Spectrum Projects
NORTH CAROLINA	
Cary	News Center in Cary Village
Chapel Hill	University News & Sundry
Charlotte	Newsstand Int'l
Hickory	C^2 Books & Comics
Jacksonville	Michele's, Inc.
Kernersville	K & S Newsstand
Marion	Boomers Rhythm Center
Winston-Salem	K & S Newsstand (3 Locations)
	Rainbow News Ltd.
OHIO	
Akron	Churchill News & Tobacco
Canton	Little Professor Book Center
Chardon	Thrasher Radio & TV
Cincinnati	Cinsoft
Cleveland	Erieview News
Columbiana	Fidelity Sound & Electronics
Columbus	B5 Software
	Micro Center
	The Newsstand
Dayton	Books & Co.
	Huber Heights Book & Card
	Wilke News
	Wright News & Books
Dublin	Book Barn
Fairborn	News-Readers
	Wilke's University Shoppe
Findley	Open Book
Kent	The News Shop
Lakewood	Lakewood International News
Lima	Edu-Caterers
Miamisburg	Wilke News
Parma	Bookmark Newscenter
Toledo	Leo's Book & Wine Shop
Warren	Book Nook, Inc.
Xenia	Fine Print Books
Youngstown	Plaza Book & Smoke Shop
OKLAHOMA	
Oklahoma City	Merit Micro Software
Taklequah	Thomas Sales, Inc. dba Radio Shack
Tulsa	Steve's Book Store
OREGON	
Eugene	Libra Books — Book Mark
Portland	Fifth Avenue News
	Rich Cigar Store, Inc.
	Sixth & Washington News
Salem	Capitol News Center
	Checkmate Book
PENNSYLVANIA	
Allentown	Owl Services
Altoona	Newborn Enterprises
Bryn Mawr	Bryn Mawr News
Feasterville	Global Books
King of Prussia	Gene's Books
Malvern	Personal Software
Reading	Smith's News & Card Center
Temple	Software Corner
West Chester	Chester County Book Co.
Wind Gap	Micro World
York	The Computer Center of York
	Tollgate Bookstore
RHODE ISLAND	
Newport	Bellevue News
SOUTH CAROLINA	
Charleston Hts.	Software Haus, Inc.
Clemson	Clemson Newsstand
Florence	Ray's #1
Greenville	Palmetto News Co.
Spartanburg	Software City
TENNESSEE	
Brentwood	Bookworld #5
Chattanooga	Anderson News Co.
	Guild Books & Periodicals
Dickson	Highland Electronics
Knoxville	Anderson News Co.
	Davis-Kidd Bookseller
Memphis	Computer Center
Nashville	Davis-Kidd Booksellers
	Mosko's Place
	R.M. Mills Bookstore
Smyrna	Delker Electronics
TEXAS	
Big Spring	Poncho's News
Desoto	Maxwell Books
Elgin	The Homing Pigeon
Harlington	Book Mark

UTAH	
Provo	Valley Book Center
VIRGINIA	
Danville	K & S Newsstand
Hampton	Benders
Norfolk	I-O Computers
	Turn The Page
Richmond	Volume I Bookstore
WASHINGTON	
Port Angeles	Port Book & News
Seattle	Adams News Co., Inc.
	Bulldog News
Tacoma	B & I Magazines & Books
	Nybbles 'N Bytes
WEST VIRGINIA	
Huntington	Nick's News
Logan	Stan's Electronics & Radio Shack
Madison	Communications, LTD
Parkersburg	Valley News Service
South Charleston	Spring Hill News
WISCONSIN	
Appleton	Badger Periodicals
Cudahy	Cudahy News & Hobby
Kenosha	R.K. News, Inc.
Madison	Pic A Book
	University Bookstore
Milwaukee	Juneau Village Reader
Waukesha	Holt Variety
ARGENTINA	
Cordoba	Information Telecommunicationes
AUSTRALIA	
Blaxland	Blaxland Computers
Kingsford	Paris Radio Electronics
CANADA:	
ALBERTA	
Banff	Banff Radio Shack
Bonnyville	Paul Tercier
Brooks	Double "D" A.S.C. Radio Shack
Calgary	Billy's News
Claresholm	Radio Shack Associated Stores
Drayton Valley	Langard Electronics
Edmonton	CMD Micro
Edson	Radio Shack, asd
Fairview	D.N.R. Furniture & TV
Fox Creek	Fox City Color & Sound
	A.S.C. Radio Shack
Ft. Saskatchewan	Ft. Mall Radio Shack, ASC
Grande Cache	The Stereo Hut
Grande Centre	The Book Nook
Hinton	Jim Cooper
Innisfail	L & S Stereo
Lecombe	Brian's Electronics
Leduc	Radio Shack Associated Stores
Lethbridge	Datatron
Lloydminster	Lloyd Radio Shack
Okotoks	Okotoks Radio Shack
Peace River	Radio Shack Associated Stores
	Tavener Software
St. Paul	Walter's Electronics
Stettler	Stettler Radio Shack
Strathmore	Wheatland Electronics
Taber	Pynewood Sight & Sound
Westlock	Westlock Stereo
Wetaskiwin	Radio Shack
BRITISH COLUMBIA	
Burnaby	Compulit
Burns Lake	VT. Video Works
Campbell River	TRS Electronics

BRITISH COLUMBIA (cont'd)	
Chilliwack	Charles Parker
Coquitlam	Cody Books LTD
Coortenay	Rick's Music & Stereo
Dawson Creek	Bell Radio & TV
Golden	Taks Home Furnishings
Kelowna	Telesoft Marketing
Langley	Langley Radio Shack
Nelson	Oliver's Books
New Westminster	Cody Books LTD
Parksville	Parksville TV
Penticton	D.J.'s
	Four Corner Grocery
Sidney	Sidney Electronics
Smithers	Wall's Home Furniture
Squamish	Kotyk Electronics
Vancouver	Active Components
	Friendlyware Computers
	Granville Book Co.
	Siliconnections Books LTD
100 Mile House	Tip Top Radio & TV
MANITOBA	
Altona	L.A. Wiebr Ltd.
Lundar	Goranson Elec.
Morden	Central Sound
The Pas	Jodi's Sight & Sound
Selkirk	G.L. Enns Elec.
Virden	Archer Enterprises
Winnipeg	J & J Electronics Ltd.
NEW BRUNSWICK	
Moncton	Jeffries Enterprises
Sussex	Dewitt Elec.
NEWFOUNDLAND	
Botwood	Seaport Elec.
Carbonear	Slade Realties
NOVA SCOTIA	
Halifax	Atlantic News
ONTARIO	
Angus	Micro Computer Services
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Clearbrook Software Group 129
CoCo Cat Anti Drug 103
CoCo Gallery Live 49
Cocotech 123
Cognitec 29
Colorware 22, 23
Computer Center 107
Computer Island 111
Computer Plus 3
Computerware 167
D.P. Johnson 181
Dayton Associates of W. R. Hall, Inc. 134, 135
Delphi 34, 35
Diecom .... IFC, IBC
Disto/CRC 177
E.Z. Friendly Software 125
Electronic Energy Control 73
Frank Hogg Laboratory 40, 41
Gimmesoft 139
Glen Calafati 137
Hard Drive Specialists 17
Hawkes Research Services 149
Howard Medical 66, 194
J & R Electronics 166
K—SOFT 45
KLC Software 75
Metric Industries 115
Micro Works, The 109
Microcom Software 9, 11, 13, 15
Microtech Consultants Inc. 163
MicroWorld 113
NRI Schools 99
Other Guys CoCo, The 101
Owl-Ware 69, 70, 71
Performance Peripherals 61
Perry Computers 179
Preble's Programs, Dr. .... BC
Public Domain 166
PXE Computing 7
R.A.D. Products 31
R.G.B. Computer Systems 123
R.J.F. Software 55
Rainbow Binder 180
Rainbow Bookshelf 172
Rainbow Gift Subscription 57
Rainbow on Tape and Disk 119
RAINBOWfest 50, 51
Sardis Technologies 171
SD Enterprises 67, 77, 121
SEESOF 143
Software House, The 133
SpectroSystems 149
Speech Systems 46, 47
SPORTSWARE 85
Sugar Software 105
Sundog Systems 39
T & D Software 87, 186, 187
Tandy/Radio Shack 26, 27
Tepco 83
Three C's Projects 25
Tom Mix Software 193
Tomela & Co. 137
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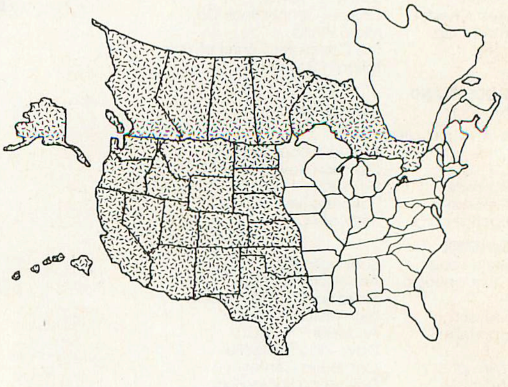

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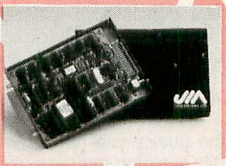

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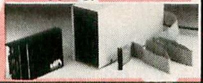

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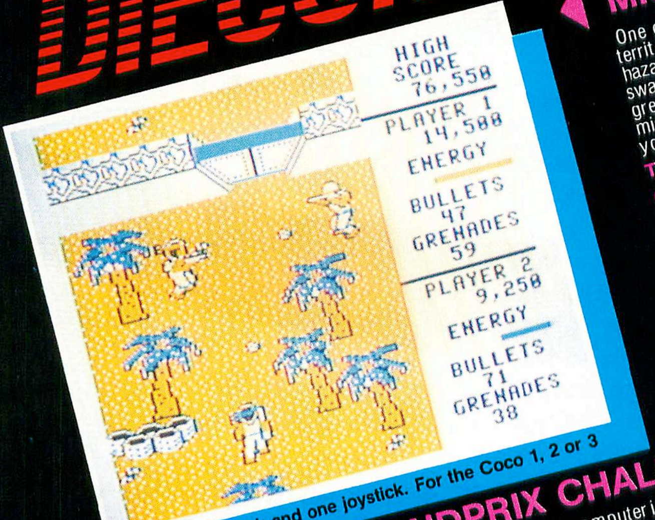

Requires 64 k and one joystick. For the Coco 1, 2 or 3

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Race alone against the computer, or with a friend against the computer in this high speed racing game. You compete in 5 lap races around twisting and turning race courses. Finish the race ahead of all the computer cars and you will progress to a more challenging course. Collect repair tools as you race around the track and you will be able to increase the speed and handling of your race car. But watch out for oil slicks and water puddles on the track or you might find your car crashing into a wall. Detailed 320 × 200 graphics and realistic driving conditions make this a must for your Coco 3 collection. Many different race tracks will keep you challenged.

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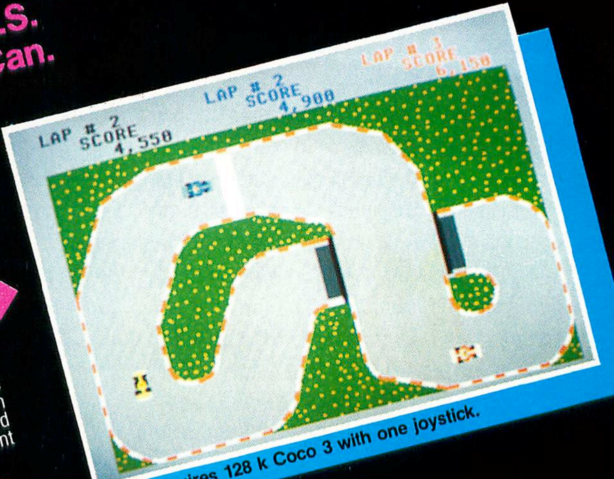

Requires 128 k Coco 3 with one joystick.

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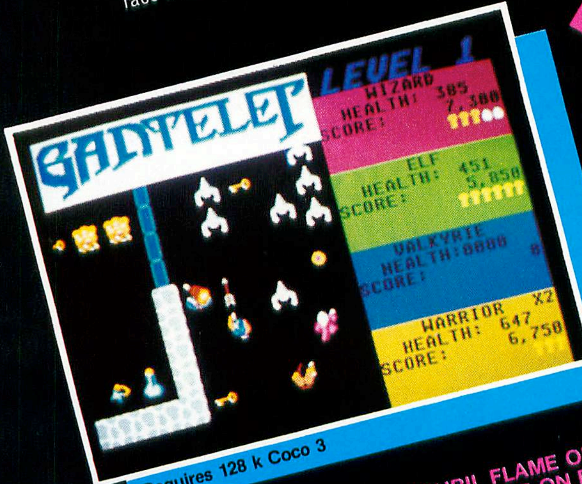

Requires 128 k Coco 3

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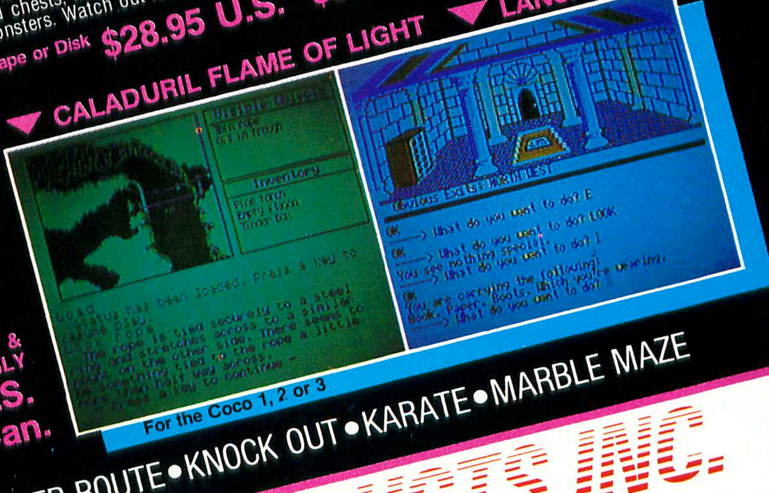

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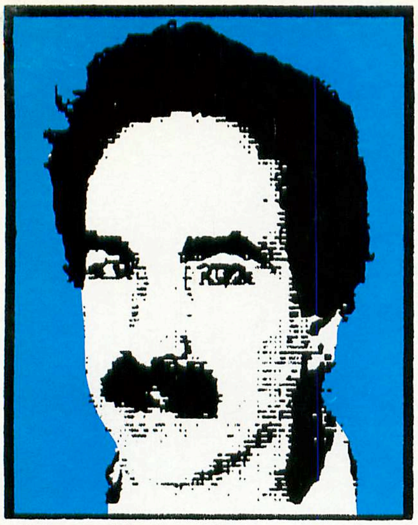

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Vocal Freedom

I've got to admit, this is one nifty computer program. Vocal Freedom turns your computer into a digital voice or sound recorder. The optional **Hacker's Pac** lets you incorporate voices or sounds that you record into your own BASIC or ML programs. This is not a synthesizer. Sounds are digitized directly into computer memory so that voices or sound effects sound very natural. One "off-the-shelf" application for Vocal Freedom is an automatic message-minder. Record a message for your family into memory. Set Vocal Freedom on automatic. When Vocal Freedom "hears" any noise in the room, it plays the pre-recorded message! Disk operations are supported. VF also tests memory to take advantage of from 64K up to a full 512K. Requires low cost amplifiler (RS cat. #277-1008) and any microphone.

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